A

PRACTICAL TREATISE

ON

GENITO-URINARY AND VENEREA

DISEASES AND SYPHILIS.

BY

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AS AN EXPRESSION OF HIGH REGARD,

THIS WORK IS DEDICATED BY

THE AUTHOR.

PREFACE.

In preparing this third edition the author has endeavored, as in the past, to present a practical, up-to-date, and compact treatise. His aim has been to avoid both the tediousness of an encyclopædia and the disappointing brevity of an epitome, and to present a thorough, systematic description of the cognate subjects treated in this volume in a terse and clear manner. Care has been exercised not to overburden the text by describing in detail as morbid entities symptoms and conditions which constitute well-recognized abnormal states. Over-elaboration of rare anomalous conditions, or malformations or unimportant diseases has been avoided, as well as needless repetitions in the various chapters.

The endeavor has been made to present only trustworthy practical information, and to omit surgical and therapeutical procedures of little or doubtful value.

The text has been fully revised and many new sections have been added throughout the work, with the view of presenting the salient phases of progress.

The various genito-urinary affections have received full consideration, and the aim of the author has been so to simplify the subject that their study shall be easy and luminous. Due attention has been paid to the description of the different operations upon the genito-urinary system, and the various new operative procedures will also be found.

In all matters relating to treatment, surgical or medical, the author has aimed at presenting wholesome, conservative, and practical directions; and while surgery proper has received full consideration, it has been recognized that its performance is but a part, and not the one aim of therapeusis.

The subject of gonorrhœa in all its phases has been exhaustively given, with full, practical, and, it is hoped, judicious treatment. Attention has been directed to the fallacies and dangers in some of the views nowadays advanced in the therapeutics of this disease, and an emphatic protest against them has been made.

Syphilis in all its conditions and relations has been comprehensively considered, and much care has been exercised in the concise presentation of a practical, methodical course of treatment.

With the exception of a few all the illustrations in this volume have

been made under the personal supervision of the author from his own cases, and in this edition twenty-five new illustrations and twelve plates in colors and monochrome have been added.

It is gratifying to mention the rapid exhaustion of the very large second edition of this work, and the appearance of an Italian translation of it issued by the Union Tipografico Editrice of Turin.

I am indebted to Dr. Ward A. Holden for the chapters on Syphilis of the Eye and of the Ear.

In presenting this new edition I venture to hope that it will prove a satisfactory and trustworthy guide for practitioners of medicine and students who desire information upon the subjects therein considered.

ROBERT W. TAYLOR.

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CHAPTER XLIX.

GENITO-URINARY AND VENEREAL DISEASES, AND SYPHILIS.

CHAPTER I.

GONORRHŒA IN THE MALE.

GONORRHŒA, the most frequent of all venereal diseases, and the one essentially of sexual origin, is a virulent process, attended by much suppuration, which attacks chiefly the mucous membrane of the urethra, male and female, and the parts in immediate and more remote anatomical relation. The mucous membrane of the eye is also particularly susceptible to its action. There is no doubt that the rectal and anal mucous membrane may be attacked by this process, but there is much doubt about the existence of gonorrhœa of the mouth and nose. In this work the terms gonorrhœa and urethritis will be used interchangeably.

Gonorrhœa is mostly found in young men; but instances of children, and even infants, being thus affected are far from uncommon. Toward puberty it is very often found in the male; while between the twentieth and thirtieth years its frequency of occurrence is greatest. From the thirtieth year onward its occurrence grows progressively less frequent, but it is seen in a goodly number of cases of middle-aged, and even of old, men.

Gonorrhœa occurs much more frequently in the male than in the female. The first attack is usually more acute and severe than are subsequent ones, which are very often subacute in form and chronic in course. When many years have elapsed between two infections, the second may be equally as severe as the first. In very many cases of men who have had in the past an attack of gonorrhœa acute urethral suppuration may be solely due to sexual and alcoholic excesses, which have changed a chronic and dormant localized inflammation of the urethra into a more or less acute condition. This affection is called by some bastard gonorrhœa, and by others simple urethritis.

Gonorrhœa is one of the most persistent diseases which attack mucous membranes. It invades the tissues deeply, and as a consequence it is very often difficult to cure. After a more or less prolonged chronic

stage it often settles down into a latent and dormant condition in a localized form, and may thus cause no symptoms for years. Then, again, this condition of latency may be frequently varied by acute attacks of the disorder.

In many cases it passes away and leaves no bad effects. In others it leads to the development in the male of such painful complications as swelled testicle and abscess in connection with the urethra. In the female it may lead to cystitis, inflammation of the os uteri, the tubes, the ovaries, and even to peritonitis. Its long duration in the male urethra frequently leads to stricture, with its distressing and often fatal results from bladder, prostatic, and kidney complications. By the action of the toxins which the gonorrhœal process gives forth, and also from the absorption of its virulent microbes from the urethra into the circulation, violent and painful inflammations of joint-structures, joints, tendinous sheaths, bursæ, fasciæ, and fibrous tissues are produced. In many of these inflammations gonorrhœa seems to produce a true septicæmia through the action of its own virulent microbe. In many cases it is very probable that the morbid action of the gonococcus prepares the tissue for the invasion of pyogenic microbes. By these combined or mixed forms of infection the whole organism may be involved, and severe illness, structural impairment of parts, invalidism, and even death, may be produced. By reason of this action of the gonococcus alone or aided by that of other pyogenic microbes the eyes, the heart and its membranes, the coverings of the spinal cord (and, it is also claimed, those of the brain) may be attacked, and serious, even fatal results may follow.

When we consider the vast range of pathological conditions which gonorrhœa may cause or lead to, we are certainly warranted in asserting that it is, taken as a whole, one of the most formidable and far-reaching infections by which the human race is attacked.

In the vast majority of cases of gonorrhœa the gonococcus is the infecting agent and in a minority a number of pyogenic microbes, notably the staphylococci and streptococci, are the causative factors.

Predisposing Conditions and Causes.—The size and conditions of the penis are frequently factors in the contracting of gonorrhœa. Thus a very long organ is frequently infected by pus from the uterine neck or fornix vaginæ, while a shorter one may escape. A very large and thick organ may give rise to friction and irritation, and in that way become infected. Patients with naturally large meatuses, and particularly those in whom unnecessarily large meatotomy has been practised, are also very susceptible. A meatus which opens on the under surface of the glans resembling hypospadias, and the condition of hypospadias itself, predispose its bearer to gonorrhœal infection. Then, again, cases

are seen in which this form of the opening exists, and with it shortness and tightness of the frænum, and perhaps of the prepuce. In such cases there are much redness of the fossa navicularis and a marked tendency to acquire gonorrhœa. In these cases, and in those of hypospadias where the meatus is thus placed low in the glans, it is probable that the secretions of the vagina, which gravitate to its posterior wall, are sucked in by capillary attraction, and find easy entry into the fossa navicularis and urethra, and there produce infection.

In fact, any structural condition that causes hyperæmia of the distal part of the penis may render its bearer liable to contract gonorrhœa.

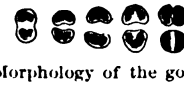
Long-continued copulation, particularly in persons under the influence of alcoholics, is a potent factor of infection. In such cases ejaculation is much delayed, the penis and vagina are much irritated, and gonorrhœa very frequently follows. Indeed, venereal excesses are common and prolific causes of gonorrhœa. Persons who have recently recovered from an attack of gonorrhœa are especially predisposed to subsequent infections.

There can be no question that in some cases of early syphilis the distal parts of the urethra are rendered more prone to the invasion of gonococci and other microbes. This tendency may be brought into action by abnormal conditions of these parts, and may exist in cases where no abnormality is present. An active syphilitic diathesis can undoubtedly be at the root of the persistence of a gonorrhœa, and may also be a factor in the induction of relapses. It must be borne in mind that the disease then is not syphilitic in nature. It is an infective urethritis, due to micro-organisms, occurring in a syphilitic in whom the diathesis is still active and whose tissues are more vulnerable to irritation and microbic invasion than those of a previously healthy person.

THE GONOCOCCUS.

The gonococcus is clearly revealed to the eye by means of staining-processes and by the microscope with a high power and oil-immersion, using at least a $\frac{1}{12}$-inch lens. It is a relatively large micrococcus, nearly always appearing as a diplococcus. It measures 0.8 to 1.6 micromillimetres in length and 0.6 to 0.8 micromillimetres in breadth. The gonococci are usually found in pairs, each half of the diplococcus being of kidney shape, and the two thus resemble a coffee-bean or a French roll. Occurring thus in pairs, they lie close together, their flattened surfaces being in close coaptation and their outer margins convex. Between each coccus is a very narrow split which shows as a bright

FIG. 1.



Morphology of the gonococcus (after Bumm).

line. In these particulars the gonococcus resembles other diplococci. In its multiplication this diplococcus divides by a transverse cleavage or at right angles to the median fissure. By this means of fission each pair of the diplococcus is converted into four diplococci, which are grouped in fours. The mode of division is schematically pictured in Fig. 1. Beginning at the left hand of the figure, the line of cleavage is shown to be more and more distinct until the full development is reached, as pictured in the right-hand figure. In this way these micro-organisms increase and multiply. Other diplococci, however, develop in a similar manner. From this method of transverse fission and growth originates the peculiar grouping of the gonococcus into twos and fours and their multiple derivatives.

In the acute stage of gonorrhœa these diplococci are found in greater or less number encapsulated in masses within the pus-cell. When numerous and thus seated they have been said to present the appearance of a swarm of bees. Under rather low powers they look like little particles of gunpowder. They may be so numerous within a pus-cell as to rupture its wall. Then we find the cocci lying free in the serum, scattered in a disordered manner between the pus-cells, but even then presenting the four and multiple-of-four arrangement. Early in the infection gonococci are seen seated upon epithelial cells.

Under microscopical examination gonococci are readily found and recognized in the pus of acute gonorrhœa. Then the clinical features of the infection and the microscopical picture of the discharge and its pus, epithelium, if present, and diplococci, taken together, are so striking and unvarying that a mistake can scarcely occur. But in later stages of true gonorrhœa, and in many more or less subacute cases of urethral suppuration, it is very often most difficult, and sometimes impossible, to say whether the microbe is the gonococcus or some other form of diplococcus. In all cases the crucial test rests in cultivations and inoculations.

While, however, there is no single individual sign or mode of distinction of the gonococcus, there are a number of signs which, when taken together, offer strong presumptive evidence that the microbe in question is the one just named. These are—

1. The shape, which is, as we have seen, roundly oval, with its median fissure and its roll-like or coffee-bean appearance, and its lengthwise fissure.

2. The size: they are large diplococci, and in their development are variable and resemble other diplococci.

3. The grouping, as a result of their mode of division, is in single pairs, in fours, eights, sixteens, etc. They never occur in chains.

4. Their intracellular position: the gonococci are found in heaps

within the protoplasm of the pus-cells, and also scattered between the cells in varying numbers. Other diplococci, however, are also found within the pus-cell.

5. Their staining properties: gonococci are readily stained by aniline colors, and they readily lose their staining by Gram-Roux's method. This quality is very characteristic of the gonococcus, but it is also possessed by certain other diplococci, by streptococci, and by staphylococci.

Methods of Staining.—For general purposes a solution of methyl blue is all that is needed for staining gonococci, but fuchsine, methyl violet, gentian violet, and victoria blue may be used. The technic is as follows: Spread by means of a platinum-wire loop some of the pus, threads, or secretion on a cover-glass in a very thin film, or place a drop of the secretion in the centre of a cover-glass, and then place another cover-glass over this. Then separate the two by sliding them over each other, not by pulling them apart. In this way two evenly-spread specimens are obtained. It is always necessary to wash thoroughly the glans penis and the meatus before taking the secretion, since many microbes are seated on these parts. In taking secretions from the female genitals scrupulous care should be exercised, so that no extraneous or accidental micro-organisms are gathered up. In dispensary work the secretion from the male urethra may be allowed to drop upon a glass slide, and it is then to be spread out over its surface by drawing the edge of a similar slide over it. The specimen may be allowed to dry in the air or it may be passed two or three times (the right side up) through an alcohol or gas flame. The dried secretion is then lightly smeared with the staining fluid by means of a glass rod.

The simplest and most expeditious method of staining these specimens is to put a drop of a dilute watery solution of methyl blue upon the cover-glass, allow it to remain two or three minutes, wash off with water, and then examine in water. This may be allowed to dry, and then it may be mounted in Canada balsam. By this method, however, the gonococci are not shown so clearly as by others to be mentioned.

One of the most satisfactory and rapid methods of examination is that recommended by Schütz. This is founded on the resistance of the gonococcus to acetic acid after being stained with methyl blue. After the cover-glass is covered with a thin film of the suspected material it is passed three times through the flame. It is then brought in contact with a saturated solution of methyl blue in 5 per cent. carbolic-acid water for five or ten minutes. It is then washed with water and placed, for a time long enough to count one, two, three slowly, in a solution of five drops of acetic acid in twenty cubic centimeters of distilled water,

and immediately washed again in pure water. Everything is then decolorized except the gonococci, which remain distinctly blue. The specimen may be then examined and preserved, or at this stage it may be double stained with a very dilute aqueous solution of safranine. This second staining should be very slight, the cover-glass being washed at once in pure water. By this process the gonococci will be found of a deep-blue color, the epithelial cells of the same color, while the pus-cells and their nuclei will be salmon-colored.

Technic of Gram's Method for Staining Gonococci.—The most reliable means of recognizing the gonococcus is that known as the Gram-Roux method. The procedure is as follows: 1. Make a smear of the suspected discharge on a cover-glass or slide. 2. Pass same three times through the flame of an alcohol lamp or Bunsen burner. 3. Stain for two to four minutes with anilin gentian-violet solution, made as follows: anilin oil, 1 part; distilled water, 20 parts. Shake well. Filter through moistened filter-paper. To filtrate add saturated alcoholic solution of gentian-violet in the proportion of 1 part to 10 of filtrate. This should be made fresh every day. 4. Transfer specimen directly to solution of: iodine, 1 part; potassium iodide, 2 parts; water, 300 parts. Allow it to remain from one to three minutes. 5. Transfer to absolute alcohol, which should be changed two or three times until decolorization of specimen is completed. 6. Transfer to solution of Bismarck brown (saturated alcoholic solution B.B., 1 part; water, 10 to 20 parts). Stain for half a minute. 7. Dry and mount in balsam; or if it is not desired to preserve specimen, it may be examined directly by oil immersion lens with the aid of oil of cedar. By this method the pus-cells are stained a light brown, and the gonococci are decolorized and are shown in marked contrast imbedded in the cells. This method is considered the most reliable for the diagnosis of gonococci in a specimen of urethral discharge. There are a number of other cocci, however, which are decolorized by the use of Gram's method, so that the situation and morphology of the cocci should be taken into account in making the diagnosis.

Roux says that he learned by experiments that Gram's liquid does not sufficiently and firmly fix the basic aniline colors in gonococci, but that as soon as the specimen is treated with absolute alcohol these cocci and the anatomical elements become very difficult to recognize with the microscope. This negative fact therefore constitutes an element of diagnosis, since other micro-organisms do not thus become decolorized. He claims, therefore, that when the presence of gonococci is shown by aniline dyes, and upon the addition of Gram's liquid and alcohol they disappear, it is certain that Neisser's coccus is present. On the other hand, if the micro-organisms remain stained, they are in all probability not gonococci.

No trouble will be experienced in studying the secretion of acute gonorrhœa even when some weeks old. But the doubt arises in subacute and chronic cases, just the ones in which we are anxious to determine whether the long-drawn-out inflammation is really kept up by the gonococcus, and whether this micro-organism has, as it is claimed it has, an indefinite life as a morbific agent in the male urethra.

A New Stain for Gonococci in Chronic Gonorrhœa.—It is well known that the secretion of chronic gonorrhœa is very difficult to stain, and that the basic aniline dyes are not convenient for this purpose, as they fade quickly and stain gonococci and nuclei alike. v. Wahl therefore suggests a mixture of auramine and thionin, consisting of 15 c.c. of a saturated alcoholic solution of "auramine II." (1 : 10) and from 8 to 10 c.c. of a saturated alcoholic solution of thionin (1 : 20), to which 30 c.c. of distilled water are added after shaking. If a bright staining of the cellular elements is aimed at, it is advisable to add a little watery solution of methyl-green (1 : 50) and a corresponding amount of thionin. The nuclei are then stained bluish-green and the gonococci deep violet. The mixture without these additions stains (in from ten to fifteen seconds) the cellular elements a light green and the gonococci a dark violet.

FIG. 2.

Showing on the left half some groups of gonococci obtained by culture, and on the right half some groups of a so-called pseudogonococcus cultivated from a specimen derived from a normal urethra virgin to gonorrhœa.

This micro-organism outside of the human body has little vitality. Its culture media are blood-serum, and blood-serum and agar-agar, and urine and urea, in acid solution.

It is well to emphasize the following facts: In the normal urethra are found innocuous and virulent microbes of whose history and pathogenic power we as yet know little. Whether these organisms play any part in urethral inflammation we do not now know. One of them termed a pseudogonococcus so much resembles the gonococcus that it is a source of error in 5 per cent. of cases of the recognition of the latter (see Fig. 2).

CHAPTER II.

INVASION OF THE TISSUES BY THE GONOCOCCUS.

THE process of the invasion of the tissues by the gonococcus may now be considered. Owing to the great difficulty, and at times impossibility, of obtaining a urethra the seat of active gonococci invasion, Bumm studied the subject upon the conjunctiva of infants inoculated with gonococci-containing pus. As the mucous membrane of the eye resembles that of the urethra, and as the two membranes react similarly to gonorrhœal infection, it is fair to assume that the morbid processes and appearances are similar in each instance. It is this want of pathological material on my own part which forces me here to make use of Bumm's observations and results.

Having gained a foothold on the superficial epithelial layers, and there having greatly increased in numbers, the gonococci penetrate between the epithelial cells, which have become swollen and succulent, into the soft protoplasm substance. It is interesting to note that in the infective process the cocci themselves are the active agents in attack and penetration, and that they are not enclosed in pus-cells. Indeed, active participation of the pus-cell is not observed. The spreading of the micro-organisms onward is thought by Bumm to be due to their growing more actively on one side—a condition caused by the difference in soil and probably by an increased supply of oxygen. In all cases the road traversed by the gonococci is through the cement-substance between the cells. Sometimes they penetrate in single rows; then again they advance in a larger body; and when the tissues will admit, they form a roundish colony, and from that nidus make further incursions into the tissues. When they have got well down toward the subepithelial connective-tissue layer, reaction on the part of the tissues occurs. Then great numbers of white blood-cells escape from the dilated capillaries, together with much serum. This stream of pus, pouring out, breaks through the epithelium or ever carries it away in small or large plates. The removal of the epithelium then permits further invasion of the gonococci even to the papillary layer, but there it stops. Pus-cells with the gonococci may now be seen but free gonococci are much more numerous. Coincidently with the cocci invasion and multiplication the inflammatory process increases in intensity, and a dense round-cell infiltration is formed beneath the surface of the mucous membrane. This is the transition to the purul

PLATE I.

INVASION OF THE TISSUES BY THE GONOCOCCUS.

stage of gonorrhœa. In some cases, as early as the twelfth day regeneration of the epithelium begins and rapidly progresses, and then the further invasion of the micro-organism may be stopped. During this reparative process the pus-cells escape unhindered, and rows and clusters of gonococci may be harbored between the cells of the uppermost layer of the epithelial strata. Under some circumstances there may then be a new invasion by the gonococci. An outpouring of pus destroys more or less of the epithelial layer, and this opens the way for a second invasion. This condition is what occurs in relapses of acute and moderately acute gonorrhœa. The cocci may develop between the superficial connective tissue and the tunica propria, but they do not luxuriate. It seems probable that they do not find in the deep parts of the mucous membrane the conditions necessary for development, or that they are unable to withstand the influence exercised by the tissue-elements. They are most at home in the superficial layers of the connective tissue and between the epithelial cells.

In this infective process, therefore, we see a violent invasion of a mucous membrane by large masses of gonococci which penetrate between the cells. There is always to be observed a connection between the multiplication and activity of the micro-organism and the intensity of the inflammatory process. The reaction on the part of the tissues corresponds to the intensity of the irritation excited in the soft and sensitive epithelium. So long as there is secretion present on a mucous membrane, the gonococci may remain in it and multiply, for it offers a favorable culture-soil. The great mass of gonococci in the uppermost strata of tissues perish there from simple dissolution. Final healing is caused not so much through the elimination of the micro-organisms as by the development of a protective covering of squamous epithelium in several strata which closes all gaps, cracks, and inlets to further invasion. The infective process is therefore brought to an end by the energetic development of epithelium, which forms a barrier which the gonococci cannot break through. (Plate I.)

It is very probable that when gonorrhœa is caused by the staphylococcus and the streptococcus the pathological processes and changes are similar to those produced by the gonococcus. Clinical and microscopical study shows that different individuals are affected in different ways.

EXPLANATION OF PLATE I.

a, epithelial layer covered with pus-cells and gonococci. *b*, penetration of tissues by colonies of gonococci. *c*, diffuse superficial development of gonococci. *d*, superficial colonies invading epithelial layers. *e*, further penetration of the colonies into the tissues. *f*, still further penetration of the colonies. *g*, penetration into superficial portions of a papilla. *h*, penetration of gonococci into the intrapapillary layer. *i*, recurrent invasion with development of squamous epithelium.

In some the attack, as shown by the discharge, comes on briskly and promptly, while in others the morbid process develops slowly and insidiously, and often with much halting. In the very earliest period of gonorrhœa much can be learned as to the mode of invasion of the disease, and as to the pathological conditions in a given case, by the microscopic examination of the secretion. This scientific examination should be made in every case, since from its results indications of a practical nature may be derived. Not only in the very earliest stage does the microscope give much aid and broad enlightenment in pathology and treatment, but throughout the whole course of gonorrhœa its teachings are invaluable.

As will be shown farther on, the number of gonococci in the serous discharge of the first day or two shows very great differences in individual cases. In some periods, the earlier as a rule, there are enormous numbers of gonococci in the discharge, while during the latter stages of the attack there are frequently so few of them that but one or two pus-cells can be found in the entire field containing gonococci. So a drop of discharge at one stage of the attack may contain, estimating it roughly, but two or three or several hundred gonococci, while at another time the drop holds enormous quantities of the cocci—a million or more.

Thus when gonorrhœa is contracted, as a result either of the duration of the exposure to the infecting pus or according to the stage of development of the discharge in the donor, the number of gonococci received may vary within very wide limits. This numerical variability, then, in the gonococci seems in a measure to determine the period of incubation and the character of the onset of the discharge. The vulnerability of the tissues and the conditions favorable to inflammation also have much to do with the promptitude of the onset of the inflammation.

In some cases, where a very few gonococci englobed in the pus-cells are received, the discharge does not become visible for some days, although during this time there is an exudation, but it is so scanty and colorless that it escapes attention. In such a case as this it would seem that so few gonococci entered the urethra that some days are requisite for them to proliferate extensively enough to produce a widespread chemotaxis or attraction of the leucocytes from the blood-vessels of the urethral mucosa, or that the tissues were not particularly vulnerable. After the gonococci have proliferated and become more extensively distributed over the urethra, a widely-spread and severe exudative inflammation of the canal takes place more or less suddenly. An attack of gonorrhœa would be liable to begin in this slow, mild way if the infection originated from a similar discharge, such as fairly old gleet or declining

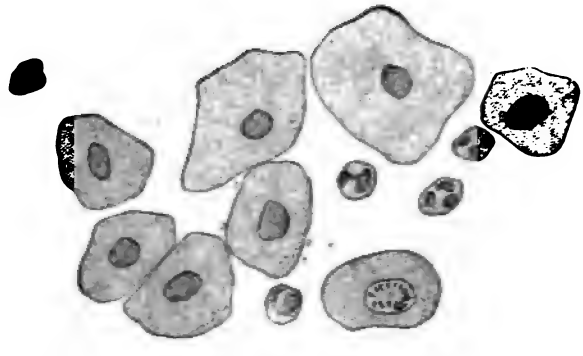
gonorrhœa, in which it takes considerable searching with the microscope to find a pus-cell here and there containing gonococci.

In other cases a severe discharge, purulent from the beginning, occurs suddenly within forty-eight or seventy-two hours after the exposure. In such a case as this we may suppose that a very large number of gonococci enter the urethra and proliferate extensively. The initial cocci are not localized, but become rapidly distributed—perhaps at the exposure—over a large surface of the urethra, and exert chemotaxis, or, in other words, produce inflammation simultaneously at many points over a large segment of the urethra.

Between these two extreme types of acute and mild invasion there are all sorts of intermediate grades of the incubation.

Subacute Invasion.—In the cases of long incubation—where there seem to be but few gonococci received at the infection, and when these remain localized for a few days before proliferating extensively enough to spread over a considerable part of the urethra—an exudation really exists during the whole period of the incubation. This exudation in the beginning is almost a microscopic element; it is exceedingly limited and serous, and so generally escapes attention that there is seldom an opportunity to examine it microscopically. After two or three or several days this scanty serous exudation, becoming gradually more copious, suddenly changes and becomes a purulent discharge. This sudden change indicates the period when the gonococci have prolif-

FIG. 3.



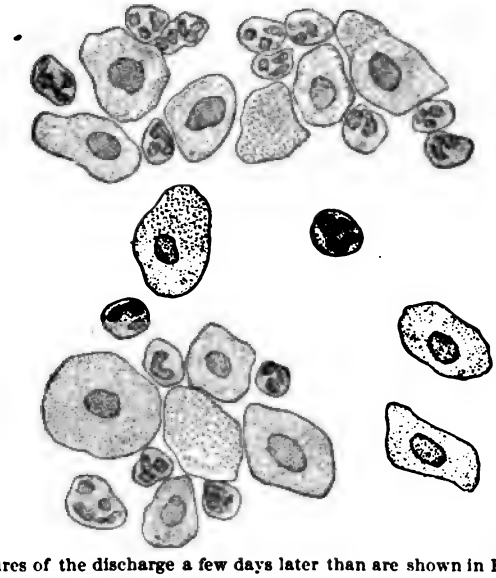
Gonorrhœal discharge in the early days of infection in a case of long incubation, showing pavement epithelial cells on which a few gonococci are seated, and a few pus-cells which as yet contain no gonococci.

erated and become extensively enough distributed to excite general chemotaxis.

In the very beginning of the prodromal or exudation stage antecedent to the onset of the purulent discharge in these cases of slow incubation there is simply a thin or sticky moisture of the walls of the

urethra. In a day or two more the exudation grows more natural, and a transparent drop the size of two or three pin-heads may be forced out of the meatus by gentle pressure. The exudation may in exceptional cases stay this way for a week. Although this exudation is not seen during the day, it appears in the first part of the urine as scanty lump-like masses. The discharge is best seen in the morning, and it then looks very much like glycerin, except that suspended in the drop are some minute translucent and whitish flocculi, like tiny particles of rice-seeds or suet. A little later the drop becomes more copious, appears during the day, and is mixed with whitish-yellow streaks; then perhaps, in a few hours or within a day, the drop may change suddenly and radically, when it becomes entirely yellow and creamy, thick and copious, and takes on the characteristics of the ordinary purulent discharge.

FIG. 4.



Showing the features of the discharge a few days later than are shown in Fig. 3. The epithelial cells are covered by an increased number of gonococci, but these microbes are not as yet contained in the substance of the pus-cells, which are rather more numerous.

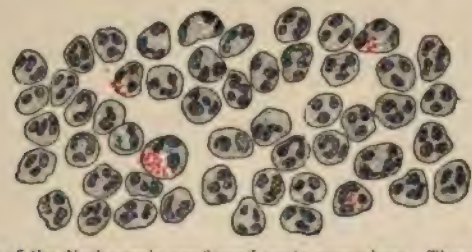
The structural features of the discharge in this early stage of its development in these cases of long incubation are as follows: The exudation consists largely of fluid or serum containing some desquamated epithelial cells, and later on only a scattered pus-cell here and there. In the early stages the desquamated epithelial cells predominate, and as the exudation progresses the pus-cells become more numerous.

It is the desquamated clusters of the cells lining the urethra that produce the appearance of the rice-like or suet-like granules in the clear drop. Finally, when the drop suddenly becomes yellow, the epithelial

cells disappear almost entirely or are overshadowed by the enormous numbers of pus-cells.

The gonococci in this stage of scanty exudation, before the regular discharge, may not be found at all by the ordinary cover-glass staining tests. If the incubation is very slow, they may be found at first in very limited numbers, entirely free in the serous fluid, later on about the edges or on the surface of the epithelial cells, and finally exclusively in the pus-cells. It is very interesting to study the spreading of the gonococci

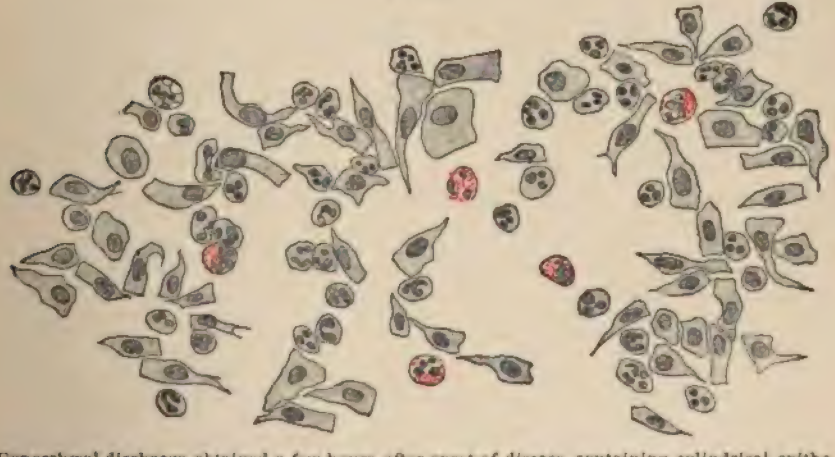
FIG. 5.



Showing the features of the discharge in confirmed acute gonorrhœa. The epithelium has wholly disappeared, and only pus-cells containing many gonococci now appear in the field.

over the surface of the cell. At first the micro-organisms may be seen only on the edges of the cell; then they gradually extend until they cover its whole surface like a sod, perhaps in several hours or perhaps in a day or two.

FIG. 6.

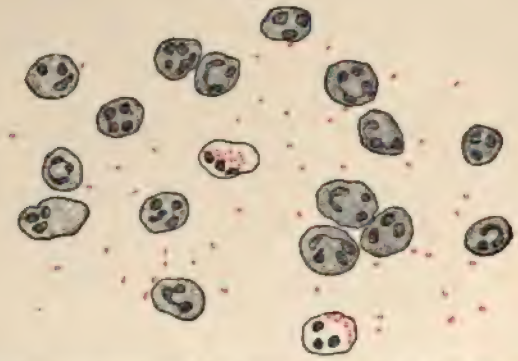


Gonorrhœal discharge obtained a few hours after onset of disease, containing cylindrical epithelium, pus-cells, and gonococci.

It is important to remember that when the discharge consists only of serum, epithelial cells, and gonococci the last-named are seated on the cells, and they also float free in the serum. This condition also may be observed where a few pus-corpuscles have become mixed in the dis-

charge. At this time, therefore, the micro-organisms may be present only in small numbers in the pus-cells, or they may not be thus placed at all. Later on, when the discharge becomes decidedly purulent, the majority of the gonococci will be found in the pus-cells, and very few will be free and scattered through the serous fluid.

FIG. 7.



Showing enormous quantities of gonococci in pus-cells and floating free.

The behavior of gonococci in a case of long incubation seems to be as follows: The gonococci received at infection are too few to be generally distributed over the urethra, and hence the chemotaxis they arouse is too limited to appear as any appreciable exudation. The cocci seem at first to lie free on the surface of the epithelium, and then they work their way down between the surface cells to the deepest layer of urethral lining cells. As the gonococci thus approach the capillaries beneath the epithelium, chemotaxis comes into play. There is at first a slight determination of leucocytes from the blood-vessels, accompanied by some serum which passes out into the urethra, and synchronously with this there is a desquamation of the epithelium lining the urethra.

As the gonococci become more and more numerous and are distributed to the deeper parts of the urethra in virtue of its capillary attraction, there comes a time when these microbes attract the leucocytes from a considerable territory of the canal simultaneously, and this corresponds to the time when the discharge suddenly becomes purulent and abundant, with the gonococci enclosed in the pus-cells.

The gonococci are found in the pus-cells, not because the cocci themselves actively penetrate the protoplasm, as has been erroneously stated, but because the leucocytes act as phagocytes. The leucocytes enclose the cocci by virtue of their amœboid properties, and carry them out of the urethra in the purulent discharge. It is the pus-cell, in all probability, which carries the infecting cocci from one person to another, and

probably very few individuals are infected by gonococci floating about free in a discharge.

Acute Invasion.—The character and onset of the cases of acute invasion may now be considered. In these cases the number of the gonococci received at the exposure is so large, their proliferation is so rapid, or they become so soon distributed—very likely at the exposure—over a large surface of the urethra, that the discharge may be seropurulent or purulent from the beginning, and in that case the preliminary scanty serous exudation previously described is very evanescent or almost entirely absent. It happens very seldom indeed that in these cases there is an opportunity to examine microscopically the evanescent serous stage of such a discharge, but still there is a stage of desquamation of the urethral epithelium in advance of the purulent discharge.

The desquamated epithelium appears as tiny rice-colored grains in a clear exudation, but this stage of desquamation is very short in these acute cases, lasting only a few hours, and then the discharge becomes purulent.

As a general rule, the long incubation of gonorrhœa is best marked in cases where the urethra has been the seat of, or damaged by, previous attacks, while the very acute invasion often is best exhibited in the virgin or normal urethra. In previous protracted or multiple gonorrhœas there is a tendency toward a distinct change in the structure of the urethral epithelium. The urethral lining in places becomes thicker, and the surface cells become flattened. Pavement epithelium then replaces the cylindrical variety. To what extent this change in the urethral epithelium determines the long incubation often seen in patients who have had many previous gonorrhœas is a rather difficult question to decide.

The Period of Incubation.—In clinical practice it is found that the period of incubation in most cases is from three to seven days and exceptionally it is two days. In many cases ten and even fourteen days may elapse after coitus before the infection is demonstrated. Periods of incubation of fourteen days and beyond are very rare. Such periods of incubation, and even longer ones up to twenty days, have been observed in patients suffering from pneumonia, typhoid fever, and erysipelas. On the other hand, the period of incubation is sometimes made shorter by prolonged sexual intercourse and alcoholic excesses.

In striking contrast with this virulent infective process, with its well-marked period of incubation, are those forms of purulent urethritis due to the passage of sounds and bougies or caused by strong injections, in all of which the discharge comes on in a few hours.

The Purulent Stage of the Disease.—When the discharge has

once commenced and becomes tangible and yellow, so that the patient notices it, its structural characters are very uniform. It consists almost entirely of pus-cells and serum. The pus-cells of gonorrhœa are larger than those of any other form of suppuration. Under the microscope with a moderate power the pus-cells can be seen scattered all over the field, with no tendency whatever to agglomeration or aggregation. Occasionally in the beginning of the purulent stage a number of red blood-cells appear, with finer and coarser bands or sheets of fibrin. Occasionally also a stray rounded or oval epithelial cell may be found here and there. A certain proportion of the pus-cells—say, one to twenty or one to fifty—contains from two to fifty or eighty gonococci enclosed in their cell-bodies.

There are seldom any free gonococci except in the earlier stages of the purulent period. The mode of invasion of the urethra by staphylococcus and streptococcus has not yet been studied.

Features of the Declining Stage.

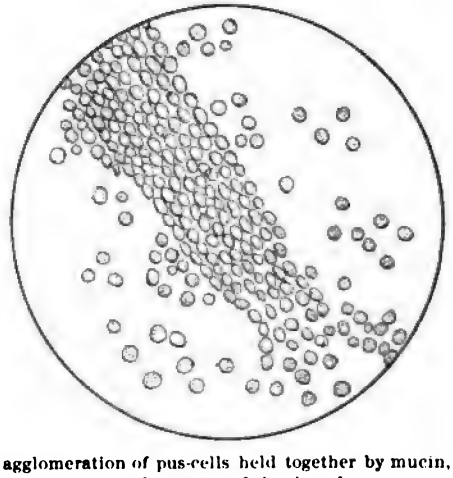
As the purulent stage declines, the secretion becomes more whitish from the admixture of mucus, and less liquid. Then it gradually grows less in quantity and more inspissated, so that toward the end of the acute stage it is not seen as a secretion, but as little yellowish-white clumps or threads in the urine. Examination of the secretion of this stage shows masses of pus-cells held together somewhat in thread form by mucus. This condition is the first step in the formation of the gonorrhœal threads, called by the Germans *tripper faden.*

In the declining period, or after the discharge has persisted as a gleet for some days or weeks, it still consists of pus-cells, less thickly aggregated, and entangled in sheets of fibrin or mucus, with a variable number of rounded epithelial cells. In this stage healing of the mucous membrane usually begins. The hyperæmia gradually grows less, the morbid surface becomes contracted, lessened in area, and a tendency is observed to render the surface of the mucous membrane normal. In this process exulcerations and eroded spots, caused by the gonorrhœa, become more or less completely covered by an epithelial coating. As this salutary epithelial proliferation goes on there is much desquamation, as well as the escape of serum and leucocytes from the membrane. It thus happens that a larger or smaller number of epithelial cells are found in a gleety discharge. With the appearance of epithelial scales the reparative process may be said really to begin, and as the case progresses the pus-cells become less and less numerous, while the epithelial cells increase in number. Then, if all goes well, these cells gradually grow less numerous, and a cure results. It follows, therefore, when in a declining gonorrhœa pus-cells persist in great numbers, while epithelial cells are

scanty, that there is slow progress toward cure. Then, on the other hand, when frequent examinations show that the pus-cells are disappearing and that the epithelial cells preponderate, it is evident that the morbid process is ceasing. As in the early stages, so in the later ones, the microscope gives us great aid in determining the character and extent of the inflammatory process. In these later stages the discharge is commonly so scanty that it does not escape from the meatus, but it is carried from the canal by the stream of urine. This discharge is then seen to be in the form of clumps rounded, irregular, or crab-like, in the form of flakes of various size and irregular shapes, and in the form of threads which may be long and very thin or thick or short and stumpy. The *threads* from either the anterior or posterior portion of the urethra have the same microscopical structure as the gleety drop; they are composed quite considerably of pus-cells entangled in a thick fluid exudation containing fibrin or mucus and generally a variable number of epithelial cells.

Gonorrhœal Threads.—Gonorrhœal threads, or urethral filaments, may be divided into four quite distinct varieties. First, there is the pus-thread. The second is the gelatinous thread. The third is a firm thread, consisting of pus, mucus, round, and epithelial cells, and indicative of a well-developed chronic exudative process. The fourth form of thread consists chiefly of epithelium, with very little pus, and some basement mucin to hold the cell-elements together.

FIG. 8.



Showing a thread-like agglomeration of pus-cells held together by mucin, being the first stage in the formation of the thread

The first form or pus-thread is pictured in Fig. 8. It is a thread only in the sense of pus-cells being agglutinated with each other or strung together by means of mucin as a basement-substance. It may

be in the form of threads, clumps, and irregular masses. This product is observed just before the appearance of epithelia in the threads.

The gelatinous threads are seen most commonly toward the end of the acute stage, when mucin comes to be secreted and acts as a cement-substance for the cellular exudation. These gelatinous threads are also not uncommonly seen late in the course of gonorrhœa when the exudative process still lingers in the submucous connective tissue and the overlying membrane is in a catarrhal condition. These gelatinous threads are sometimes finer than the finest hair, and are of intermediate sizes

FIG. 9.

Mucin, pus, and epithelium.

FIG. 10.

Showing gelatinous thread with pus-cells, round hyaline (iodophilous) cells, epithelial cells held together by mucin; declining stage of acute gonorrhœa.

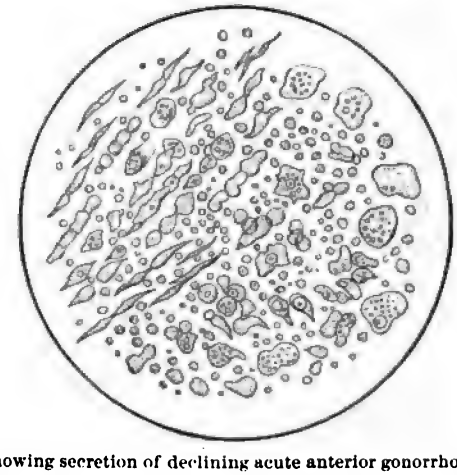
until the dimensions of a knitting-needle are reached. They are often very long (three, four, and more inches), and float about in the urine in graceful curves. Then, again, they are thicker, less lengthy, and perhaps of irregular calibre. They are usually very elusive, and are with difficulty captured by the pipette or the forceps, and when caught they collapse into a little gelatinous mass. In this form of thread we find entangled in the cement-substance pus-cells, round-cells, and perhaps some large flat epithelial cells. This form of thread is usually seen to follow the pus-thread already pictured in Fig. 8, in which no epithelium is yet present, and which is symptomatic of the turning-point in the acute stage of the disease. With these gelatinous threads there is frequently such an amount of mucus as to render the urine cloudy, though

not opaque, and very often to look like mucilage diluted with water, or new cider. The microscopical appearances are shown in Figs. 9 and 10,

The third form of urethral filaments consists of whitish-gray and brownish-white threads, varying in length from a third of an inch to an inch and more in length. They may be thread-like, thin, and delicate or thick and stumpy. Some have a distinct head, and resemble a comma, and are said to come from the posterior urethra. Then, again, they present branched forms, and some resemble crabs in shape. Indeed, words fail to describe all the shapes assumed by these urethral exudates. Examined under the microscope, these pathological products are found to consist of round cells, hyaline cells readily colored with iodine (iodophilous), pus-cells, epithelial cells, oval, polygonal, irregular, fusiform, and caudate. All these elements are held together in the most complete disorder as to arrangement by the basement-substance. In Fig. 11 is well portrayed the appearance of the discharge in chronic gonorrhœa of the bulb, and its study will give a clear idea of the microscopical picture.

The scaly threads or flakes which form the fourth variety are less common than the threads just described. They may be seen in the form of a coarse powder, in threads, in lumps, and flakes of whitish-gray color. They are firm in structure, and readily sink to the bottom of the glass. Examined with the microscope, these flakes show a quite uniform field of flat epithelium in various shapes, which shows stability of structure. Many of these cells are nucleated, and not infrequently they

Fig. 11.

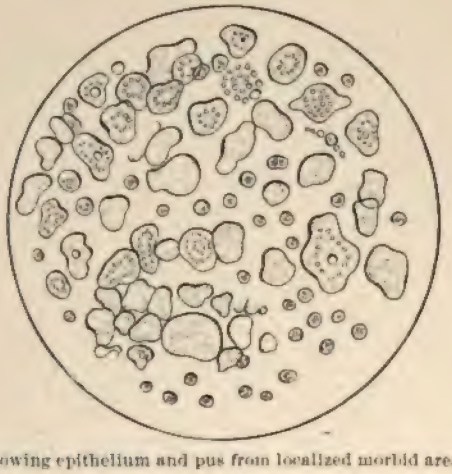


Showing secretion of declining acute anterior gonorrhœa.

are the seat of fatty degeneration. There are usually some pus-cells intermixed in the field. This form of thread or flake (well shown in Fig. 12) is usually the product of a localized inflammatory process in the anterior urethra as far down as the bulb. It is usually indicative of an

erosion or ulcer in which the reparative process is abortive, and, although new epithelium is formed, the integrity of the mucous membrane is not

Fig. 12.



Showing epithelium and pus from localized morbid area.

re-established. On finding such a microscopical picture one is warranted in making an endoscopic examination with a view of localizing the morbid area.

In stricture of the urethra the third and fourth varieties of threads are usually found, together with more or less pus and mucus.

Fig. 13.

Showing secretions of posterior urethritis in chronic stage.

Attempts have been made without success to establish sharply-marked differences in the microscopical pictures of the discharge in anterior and posterior gonorrhœa. The truth is, that in the main there are the same cellular elements to be seen in the discharge from the anterior urethra

as are found in that of the posterior urethra in chronic gonorrhœa. Consequently, in many cases the microscope affords little help in determining exactly where a discharge comes from, but it generally gives a good idea of the condition of the process. In some cases, however, we find dead spermatozoa inextricably mixed up among the cell-groups, and thus we have presumptive evidence that the morbid focus is in the posterior urethra. But even in this event a positive conclusion cannot be reached until it has been proven that the seminal vesicles are not affected, since the same microscopical picture may be presented in seminal vesiculitis. In Fig. 13 the appearances of the discharge from the posterior urethra are well shown. There is much resemblance to the picture presented by the discharge from the anterior urethra already shown. (See Fig. 11.) But it will be seen that there are many spermatozoa scattered and in clumps, and that the round cells are present in rather greater numbers.

These appearances of the morbid cellular elements in anterior and posterior gonorrhœa may be seen months, and even years, after the onset of the infection. In other words, in chronic cases the morbid process gives rise quite uniformly to the same orders of pathological products.

Disappearance of the Gonococcus.

As a general rule, the gonococcus gradually ceases in the gleety morning drop and in the threads. It becomes extinct and disappears out of the urethra, yet the gleet and threads still persist, but this is because of certain structural changes in the urethra left behind by the severe exudative inflammation caused by the gonococcus. All sorts of bacteria may be found in the threads and often in old gleets, and among them several diplococci which resemble or look almost exactly like the gonococcus; also long and thin and short and thick bacilli. In fact, by the microscope alone it is almost impossible to positively identify the gonococcus in old gleet or threads; consequently, it is well to be skeptical and perhaps incredulous as to statements of authors that they have found this microbe under these conditions.

The discharge persists after the extinction of the gonococcus because of the ulcers, erosions, small round-cell residues, and thickening beneath the epithelium, or other sequelæ incident to the intense exudative inflammation aroused by the gonococcus. An ulcer or exulceration, especially in a long, narrow, closed sinus like the urethra, will continue to exude indefinitely without any assistance of the gonococcus.

Etiology.—It has been clearly shown in the foregoing pages that the gonococcus is the *materies morbi* of gonorrhœa in the vast majority of cases, and that in exceptional instances other pyogenic microbes are the factors of infection.

There can be no doubt, therefore, that many men contract gonorrhœa from women suffering from a specific gonococcus-infection of some part of their genital tract; and, on the other hand, women are infected by men similarly infected in their urethra. But there is met with, particularly in private practice among respectable people, a class of cases in which men contract gonorrhœa from women who claim to be and seem to be perfectly healthy. The latter state that they never had the classical symptoms of gonorrhœa, and prior to the infecting coitus and after it considered themselves perfectly healthy. Many of the men thus affected have not true gonorrhœa, but a discharge resulting from an exacerbation of a dormant chronic urethritis.

Then, again, many women suffering from leucorrhœa or some disease of their sexual organs (and in whom no gonococci can be found) communicate true gonorrhœa to men in sexual intercourse. In some instances men contract the disease from seemingly healthy women in coitus during or just after the menstrual epoch. All these cases puzzle us very much, and the fact is that though we know much about the gonococcus, the etiology of gonorrhœa is to-day in a very unsettled state.

According to doctrines now largely prevailing, the gonococcus in the male is presumptive evidence of guilt of the woman. Such a doctrine is too absolute, and even cruel, and may be the cause of much unhappiness, suffering, and misery. This question often may involve the virtue of wives and the loyalty of mistresses, and demands our earnest attention. In all such cases the accused should receive the benefit of any doubt which may exist; and the physician who withholds it from her out of a morbid fear that he may be imposed upon, and thus runs the risk of convicting an innocent person, is unworthy of his calling. His province is to decide from the symptoms, taken in connection with the known facts of the case, and unless these are sufficient to establish guilt beyond the shadow of a doubt humanity demands at least a verdict of "not proven." (For a thorough discussion of this subject see my work, *The Pathology and Treatment of Venereal Diseases*, Philadelphia, 1895, pp. 85 *et seq.*)

CHAPTER III.

ACUTE ANTERIOR AND POSTERIOR GONORRHŒA, OR URETHRITIS.

Prodromal Stage.—At the end of the period of incubation the symptoms of acute anterior gonorrhœa manifest themselves. These may be quite severe or they may be mild. Patients usually complain of a tickling, pricking, and itchy sensation at the meatus or in the fossa navicularis. These sensations may be accompanied by a feeling of more or less heat in the parts. Then, again, in some cases decided uneasiness, bordering on pain, is felt, which may be spontaneous and continuous or felt only during and after urination. The intensity of these early symptoms of acute gonorrhœa very often depends largely on the nature of the patient. A nervous, worrying subject complains more or less strongly; while an ignorant, apathetic, or obtuse one may make no complaint whatever. We not infrequently see patients who positively state that the discharge is the first symptom known to them.

Inspection of the meatus in the prodromal stage shows it to be slightly reddened, glazed, and perhaps coated with a film of colorless, grayish, or opaline mucus, in which a few minute whitish flakes or suet-like lumps are mixed. This fluid is usually quite scanty, but sometimes one or more drops may be expressed from the canal. It grows more copious as time advances. Frequently this secretion produces a gluing together of the lips of the meatus in the intervals of urination, which act may be thereby impeded for a few moments. This symptom of gluing together of the lips of the meatus is frequently the first sign the patient has of his oncoming disease.

In this stage the urine is clear and free from mucus, but on agitation a few minute gray flakes or minute lumps may be seen. In other words, a few infected epithelial cells float in healthy urine.

In some cases the infective process of gonorrhœa at the onset is quite slow in development, and very little disturbance may be noted at the meatus for several days. As a rule, after the lapse of one, two, or three days a decided state of inflammation is seen. The lips of the meatus become swollen and perhaps pouting, and the redness invades the glans penis in a disk-like form around the meatus. The mucous secretion becomes increased in quantity, then assumes a decidedly opalescent hue, from which it is rapidly transformed into a milky-looking fluid, and

then into true greenish pus. A decided smarting or burning pain, called ardor urinæ, is then felt in the fossa navicularis, particularly during urination and sometimes continuously.

The irritation incident to the prodromal stage being limited to the distal part of the penis frequently gives rise to a condition of erethism in that organ, which remains in a state of incomplete erection. Desire for coitus is sometimes so urgent and uncontrollable that sexual excesses are committed and masturbation is practised, much to the aggravation of the disease. The symptoms of acute anterior gonorrhœa in its prodromal stage are strictly local in character.

With the onset of the classical symptoms of true inflammation—namely, redness, swelling, pain, and pus—the prodromal stage is said to end and the acute or florid stage to begin.

The Acute Stage.—The redness, previously limited to the halo-like disk around the meatus, may spread and involve the whole glans, which then becomes swollen. Then, particularly in cases in which the prepuce is long and tight, this mucotegumentary covering becomes red and swollen in part or in its entirety. As a result œdema may be produced, which may be limited to the region of the fossæ of the frænum or it may involve the distal part of the prepuce. In very severe cases it attacks the whole integument of the penis, and thereby causes much pain, tension, and discomfort. Frequently very little œdema is present, but we may find the lymphatics on either side of the frænum swollen, and can trace them as small, red, tender cords along the dorsum of the penis to the lymphatic ganglia in the groin, which may be more or less swollen and painful. In general, adenitis in acute gonorrhœa is of rather mild character, and it subsides in a few days, particularly if the patient can go to bed. In some cases, however, abscess-formation occurs and an inflammatory bubo results. (See Plate II.) Not infrequently phimosis is induced, which much distorts the shape of the penis. Then, again, paraphimosis is a not infrequent, painful, and disquieting complication. (See sections on Phimosis and Paraphimosis.) The discharge is then profuse, thick, creamy, and decidedly purulent, and sometimes mixed with blood. This condition of affairs, which is usually reached toward the end of the first or early in the second week, and perhaps earlier, is attended by the extension of the disease down the urethra, perhaps as far as the bulb. Then in severe cases the corpus spongiosum can be felt as a swollen, hard, cord-like tube that is painful to the touch. Occasionally we may detect along the course of this corpus spongiosum one or more swellings or periurethral nodules of the size of small shot or of a pea, which are simply inflamed follicles. They show, however, that the gonorrhœal process has involved the whole thickness of the mucous membrane, and has attacked the meshes of the corpus spongiosum. In cases presenting this intensity of symptoms the

PLATE II.

ACUTE GONORRHOEA, ABSCESS AND INFLAMMATORY ADENITIS.

whole thickness of the mucous membrane, the subcutaneous connective tissues, and the erectile tissue of the corpus spongiosum are involved. In these cases the gonorrhœal process has extended deeply; but there are cases in which the symptoms are very severe, but in which this depth of invasion of the inflammatory process cannot be made out, since the spongy urethra does not feel very much swollen. These are instances in which the gonorrhœal process is superficial and invades the mucous membrane and the submucous coat only slightly; such cases are not at all uncommon. As a result of this inflammatory swelling of the mucous and submucous tissues the calibre of the urethral canal is very much narrowed. Urination then becomes an act of pain, and even of agony, by reason of the induced scalding and burning sensations, described by some as if a hot iron had been introduced into the canal, which may be felt along the whole of the pendulous urethra or may be most severe at the fossa navicularis. Sometimes the pain is said to be at the penoscrotal angle, and at others as far as the bulb. The patient dreads to void his urine, and ventures to do so as seldom as possible.

This burning pain on urination is due to the forcible distention of the inflamed and suppurating urethra, and also to the acid condition of the urine. A further result of this mechanical narrowing of the canal is seen in the character of the stream of urine. This becomes hesitating, weak, sputtering, forked, twisted, narrow, and wiry, and the urine may even escape by drops. All the shapes of the stream of urine produced by stricture may be simulated in the acute stage of gonorrhœa. At this time a patient's suffering during urination may be still more intensified by spasmodic contractions of the compressor urethræ muscle, which not infrequently causes painful strangury.

Very often, both in the acute, declining, and chronic stages of gonorrhœa, patients complain of dribbling of urine on their linen for a few minutes after each urination. This condition is due to loss of the resiliency of the urethral canal, which by its contraction aids in the final expulsion of the last drops. The urethral walls are so swollen and œdematous that their muscular fibres have lost their tonus.

It must not be forgotten that in uncomplicated acute anterior gonorrhœa there is usually not much, if any, increased desire to urinate. Such patients can, as a rule, hold their water nearly as well as they did in health.

The acme of this acute stage, which is reached usually in the second week, is attended with a still more unpleasant train of symptoms. The urethra is then involved from the meatus to the bulb. The pendulous urethra is sensitive, and even painful, and when the disease is located at the bulb there is a sensation of tightness, and even anguish, between the

testes; walking is rendered uncomfortable and sudden jarring causes much pain. When such patients attempt to sit down they go about it slowly and carefully and avoid pressure upon the perineum. They are also careful in crossing their legs lest they should suffer thereby. Besides these pains in the penis and perineum, there may be a more or less uneasy aching and dragging pain in the testes, and also in the groins and lumbar region. As a consequence of all this suffering some patients become really ill, and they look pale, worried, and hollow-eyed, lose their appetites, feel weak, and, in short, suffer from malaise and mental depression. Some patients have a mild or pronounced fever, accompanied by chilliness, especially toward night. While such patients suffer much during the day, they frequently endure much discomfort, and even torture, during the night. Insomnia is not infrequently experienced as the result of painful erections, accompanied by debilitating pollutions, and also by chordee.

In this acute stage we often see a peculiar form of hæmaturia. Toward the end of urination or a short time thereafter a few drops of blood may escape from the urethra. Sometimes this does not occur until after the patient has replaced his penis under his clothes, which he subsequently finds stained. This postmictional hæmaturia is due to compression of the inflamed mucous membrane by the accelerator urinæ muscle and to its forced distention by the stream of urine.

In most patients the purulent discharge is more profuse in the morning, from which time it diminishes in quantity till night, when it reaches its minimum. This condition is largely due to the less frequency in urination during the night, when, of course, the secretion accumulates in the canal. It is also due in many cases to nocturnal exacerbation of the disease, resulting undoubtedly largely from exercise taken and exertion made on the day previous. When patients remain in bed the exacerbation and remission of symptoms are usually very much less marked.

This ensemble of morbid phenomena, inflammatory and subjective, is generally complete toward the end of the second or early in the third week, and its further duration depends largely upon the hygiene, regimen, diet, and treatment of the patient. If rest and quiet can be obtained and proper medication is followed, the patient's condition will begin to mend at this time. The first noticeable feature of improvement is a diminution in the patient's sufferings, particularly during urination. Then he will be progressively less troubled with his painful nocturnal symptoms, and, as a result, he will sleep better and will feel stronger and more cheerful. His appetite will become better and his general morale will be improved.

In some cases, however, pain, soreness, or a burning sensation on

urination persists after all other symptoms have become ameliorated or have even disappeared.

The symptomatic pains and uneasiness in the testes, loins, and groins will become markedly less severe. The redness (and swelling, if present) about the glans and prepuce will subside, the meatus will appear more normal in color and in shape, and the corpus spongiosum will be much less tense, swollen, and painful. Then, owing to the as yet partial subsidence of the swelling of the urethral mucous membrane, the stream of urine will become stronger and larger. The discharge is at this time usually copious, but it insensibly grows less green and becomes more milky and mucoid. Its quantity then decreases, and it gradually grows thinner in consistence. Thus it slowly disappears under favorable circumstances until only a little grayish mucopus may be seen during the day, or it may be only visible in the morning, when it glues the lips of the meatus together. This condition may remain for a few or several days, and then, if treatment is followed, no discharge can be seen and the urethra seems again in a normal condition.

The foregoing description applies only to cases of anterior gonorrhœa, in which the morbid process, as already stated, stops at the triangular ligament. In many such cases, unfortunately, toward the end of the first and in the second week the suppurative process extends to the posterior urethra, and a new order of phenomena, to be described later on, is ushered in. In this event the suppurative process in the anterior urethra may cease entirely or it may smoulder in a subacute form.

Mild Course.—It must be clearly borne in mind that the foregoing symptom-complex is that presented by a severe form of acute anterior gonorrhœa, and that there are milder forms in which the gonorrhœal process is less intense and the symptoms less severe. Thus the pain or burning on urination may amount to only a mild sensation of heat or a slight pricking or smarting. Erections may be attended with little if any discomfort, and interfere but little with the patient's sleep. There is, therefore, less heat in the canal and the erethism is mild or absent.

We constantly see cases of primary anterior gonorrhœa in which, though the purulent discharge is profuse, even sanguinolent, the inflammatory symptoms are not strongly marked and the patient's sufferings are correspondingly mild. Indeed, we see cases of profuse discharge in which patients make little if any complaint, though the inflammatory phenomena seem well marked. This may also be observed in cases in which the symptoms have been acute and intense.

Duration of Attack.—In favorable cases of acute anterior urethritis a cure may be brought about in from four to six weeks, in which event the patient may consider himself a very lucky man. We occasionally

see, however, some patients get well in three or four weeks. These favorable cases generally are instances of the result of careful hygiene and discreet regimen, combined with judicious and efficient treatment. In private practice it is very often impossible to place patients at rest, and they thereby are unable at first to avail themselves of one of the most important means of cure. Even in hospitals it is a most difficult task to keep such patients in bed. Therefore, in a large number of cases gonorrhœa runs on in patients who cannot follow the requirements of strict regimen, hygiene, and treatment. As a result the acute stage passes into the subacute, or declining, stage, which may last many months. In such cases the more or less scanty or copious discharge is the most prominent symptom.

Relapses.—In the declining stage annoying relapses are quite frequent. Sometimes these relapses are mild, and again they are severe in character. They usually grow less and less severe, and then a cure follows. Most instances of relapse are due to the carelessness and heedlessness of the patient, who indulges in alcoholics and highly-seasoned food, in venery, and in active exercise. Very often the abstinence from sexual intercourse necessitated by the gonorrhœa induces a condition of erethism in the patient, which gives rise to nocturnal emissions and brings on a relapse. Then, again, the tissues of some patients seem prone to become inflamed and slow to return to a normal condition, and in such subjects relapses are common.

It is usually in the course of or as a result of these relapses, after first and later infections, that the gonorrhœal process seems to localize itself in certain portions of the urethra—namely, the bulbous portion, the spongy portion, at the penoscrotal angle, the portion of the urethra immediately anterior to this, and in the fossa navicularis. In many cases a latent inflammation remains in one or more of the urethral crypts and follicles. Then external irritation develops this chronic condition into an active stage, when a greater or less segment of the urethra becomes involved. It is to the chronicity of the morbid process that the development of stricture of the urethra is due.

Many patients regard these relapses at periods more or less remote from the original infection as new infections. They are really, in many instances, ephemeral suppurations induced in a chronically-inflamed patch or segment of the urethra, which commonly cease on the removal of the exciting cause or as a result of proper treatment. It is these relapsing suppurations which laymen often speak of so slightingly when they say they would rather have an attack of gonorrhœa than a bad cold. They are usually promptly responsive to treatment, and in consequence of the rapidity of cure in such cases certain methods of treatment, as injections of no particular energy or value, come to have a

great reputation. In most of these cases an actual cure is not produced. The exacerbation of the chronic inflammation is for a time stayed and the pus-production ceases, but the latent condition yet remains.

Examination of the Secretion.—Much information as to the course of acute anterior urethritis may be gained from a systematic microscopical study of the secretion. (See Chapter II., page 26, *et seq.*)

Examination of the Urine.—Much light is also thrown on the progress of a case of acute anterior urethritis by the examination of the urine. In the prodromal stage the urine is at first clear, but contains little rice-like or suet-like masses, which may look like little balls or flakes or even threads. Then, perhaps for a few hours or for a day, there may be a further admixture of mucus in small quantity. Usually a marked change then ensues. The urine becomes quite opaque, and looks very much as if Indian meal had been mixed with it. This opacity increases, and becomes quite intense in the acme of the infection, in the second and third weeks and even later. If it is then passed and allowed to stand for several hours, the pus will settle to the bottom in a broad, quite firm, seemingly homogeneous yellowish-white, even greenish, layer, perhaps an inch or more thick. In cases of hemorrhage a thin red layer of blood rests on the pus-layer. Over this pus-layer will be seen a grayish, nebulous, spider-web-looking, very easily movable layer of mucus, which at first will not be as thick as the underlying pus-layer. As the case improves the quantity of pus becomes gradually less and the amount of mucus is increased. As a result the urine is less opaque. Then as the case progresses both pus and mucus gradually disappear and epithelial cells present themselves. Toward the end no pus is secreted, but a slightly increased quantity of mucus and epithelium are still present. The conditions being favorable, the excess of mucus ceases, the urethra is healed, and the patient may be pronounced well. (The reader is referred to section on Gonorrhœal Threads, see page 33, *et seq.*)

The Two-glass Test.—It is always very important to know accurately how deeply in the urethra the infection has spread. In acute gonorrhœa the urine may be examined by what is called Thompson's or the two-glass test. If the morbid process is still confined to the anterior urethra and the purulent secretion is quite copious, and the urine is voided into two glass cylinders or beakers, it will be seen that the jet passed into the first vessel is turbid, while that in the second is transparent and clear. It is then evident that the morbid process is still localized in the anterior urethra. If the infection has reached the posterior urethra and the secretion is still quite copious, and the patient passes his urine into two vessels, the urine in the first will be opaque, and so will that in the second vessel be. Up to this stage, therefore, the two-glass test is valuable in cases

of gonorrhœa of the totality of the urethra. In other words, just as long as the secretion is quite copious this two-glass test will yield accurate information; but when the morbid products become much less in quantity, less fluid in consistency, and more inspissated, then they are usually washed out with the first flow of urine, which flushes and cleans out both the anterior and posterior urethræ. It follows, therefore, that in all cases of declining gonorrhœa with scanty secretion, and in cases of chronic gonorrhœa, the two-glass test will be found wanting, and will give no information as to whether the morbid process is confined to the anterior or posterior urethra, or at best misleading information. It is evident that under these circumstances a knowledge of the condition of the posterior urethra can only be obtained by thoroughly cleansing the anterior urethra, and then allowing the patient to pass his urine into one or two glasses if a knowledge of the condition of the bladder is essential. It is very important that this cleansing process should be thoroughly done, and that the urethra should not be irritated or damaged in any degree in the operation.

Lavage of the Anterior Urethra.—The most efficient means of ascertaining the condition of the posterior urethra and bladder is by the preliminary washing out or lavage of the anterior urethra. The simplest method is to pass down to the anterior layer of the triangular ligament, the patient being in a standing position, a soft-rubber velvet-eye catheter lightly smeared with glycerin, of No. 10 or 12 French scale, or a reflux catheter, and then, by means of the hand-syringe, to inject five to ten ounces of quite warm borax, boracic-acid, or saline solution. The fluid should be thrown in slowly, and collected as it runs out of the meatus. It may be well for a few seconds to compress the meatus, and thus to cause the stream to exert greater force upon the urethral walls. When the water flows from the meatus clear and without admixture it is fair to assume, if proper care and technic have been used, that the anterior urethra is cleansed. The patient may then pass his urine into one or two glass cylinders or beakers. If the quantity of urine in the bladder is yet quite small, it is very probable that the prostatic urethra has not yet become part of the bladder, and that its secretion has not been regurgitated into or mixed with the vesical contents. Consequently, the first jet of urine will carry away all secretion from the prostatic urethra. The second stream, coming directly from the bladder, will give information as to its condition, and will determine whether the infection has invaded that viscus.

Now, in the event of the patient having much urine in his bladder, it is safe to assume that the prostatic urethra has been merged into that viscus, and that its secretion is mixed with its contents. As a result of

this condition it will be necessary to study the secretion with the microscope after it has settled, and to determine whether the tissue-elements have come from the posterior urethra alone or also from the bladder. It is always a good rule, therefore, to use lavage of the anterior urethra with a view to determine the condition of the posterior urethra. When the patient has only three or four ounces of urine in the bladder the internal sphincter usually remains competent and the prostatic urethra and bladder do not then form one cavity. It is very probable, when the morbid process in the posterior urethra is active and the secretion is thin and copious, that it tends to flow toward the bladder, since the internal sphincter is weaker than its external fellow. In this case the intermingling of the fluids occurs quite early. If, however, the secretion is thick and viscid and small in quantity, it will remain in the prostatic urethra until it is carried away with the first jet of urine, or it may become mixed with the urine in the fusion of the prostatic urethra with the bladder.

The secretion washed from the anterior urethra should be allowed to settle, and then should be examined microscopically for gonococci and tissue-elements. The urine in the first glass should be similarly treated. If two glasses have been used, the second urine may also be examined. If the bladder has been involved (and in most of the recent and even quite advanced cases the inflammation will have extended only to the portion near the neck and base), there will be found more or less pus and flat epithelium due to catarrhal desquamation—a microscopical picture in striking contrast with that presented by the secretion of the posterior urethra. By these means, therefore, we determine whether the gonorrhœal process has stopped at the bulb of the urethra or whether it has invaded the posterior urethra, and still further involved a small or a large portion of the bladder.

Invasion of the Whole Urethra.—The opinion heretofore entertained, that gonorrhœa, as a rule, limits itself to the anterior urethra, localizing itself chiefly at the bulbous portion, is wholly incorrect, since the reverse is true—namely, that, as a rule, in between 80 and 90 per cent. of cases the infection spreads through the entire length of the urethra, and only exceptionally in a minimum of cases is it limited to the anterior urethra. The contention, therefore, that posterior urethritis is a complication of anterior urethritis is false.

Diagnosis.—Commonly, the diagnosis of acute anterior gonorrhœa or urethritis is readily made by the physician. Some cases of balanitis, in which the prepuce is rather tight, resemble gonorrhœa, for the reason that besides the discharge the meatus may be red and swollen, and perhaps there is slight uneasiness in urination. Retraction of the foreskin and cleansing of the parts will permit a thorough examination, and then

the diagnosis can be readily made. In those cases of balanitis in which the preputial orifice is very small, even of pinhole size, more difficulty may be experienced. By means of intrapreputial injections the discharge may be removed; the parts then being dried, slight pressure upon the urethra from behind forward will reveal the presence or absence of pus in the canal. By means of the microscope we can find gonococci in the pus of gonorrhœa, but it is not found in that of balanitis.

When the initial lesion of syphilis is developed on or within the lips of the meatus a slight mucous discharge is present, and doubt as to its nature may exist up to the period when the diagnosis of chancre is made. The initial lesion may occur at one or more inches down the canal, and give rise to a discharge which is usually seropurulent and scanty. Such patients complain of a localized uneasiness and impediment to urination, and examination reveals a circumscribed thickening of the corpus spongiosum. In these cases the endoscope and the microscope afford much aid.

Gummatous infiltration occurs at any part of the pendulous urethra, and a scanty seropurulent discharge accompanies its development. The absence of inflammatory symptoms, the localization of the lesion, and the history of the patient are usually sufficient for a correct, if perhaps rather delayed, diagnosis.

The mucous fluid which exudes from the meatus when the seat of herpes progenitalis and the presence of vesicles establish the case as not one of gonorrhœa.

The pus of chancroids of the meatus is of a rusty-brown color, differing markedly from that of gonorrhœa. The points in the diagnosis of posterior urethritis have necessarily been given in the description of that condition.

ACUTE POSTERIOR GONORRHŒA, OR URETHRITIS.

When the disease reaches the bulb of the urethra that structure becomes a profusely suppurating pouch, and from it in the majority of cases the morbid process, by cell-to-cell invasion, attacks the membranous and prostatic urethræ.

Symptoms.—In many cases the onset of posterior urethritis is unattended by any marked symptoms, and it is largely by reason of this absence of symptoms pointing to the deep extension of the trouble that the opinion was held that the posterior urethra is invaded in only a minority of cases.

It has been customary to speak of a deep burning pain between the testes and in the perineum as symptomatic of involvement of the bulbous urethra—a contention which is quite correct. But it is equally cer-

tain that this symptom occurs when the infective process has invaded the urethra beyond the triangular ligament. Its import has, therefore, frequently been misconstrued. Acute posterior urethritis, moreover, may exist and gradually decline in the manner and with the same symptomatology that we have seen the infection of the anterior urethra subside. In such cases there has been no suspicion of the invasion of the canal beyond the bulb, and in all probability the two-glass test and lavage of the anterior urethra, followed by the one- or two-glass test, have not been resorted to. Thus it is that many instances of involvement of the posterior urethra have been unrecognized.

If cases of acute gonorrhœa are carefully watched as to their symptomatology and the urine is properly examined, it will be found that in a goodly proportion the only symptoms of posterior urethritis will be a slight burning sensation deep in the canal, particularly after urinating, and a very slight increase in the number of urinations. In many cases these symptoms will only come to light as a result of the care and acumen of the physician, since many patients say nothing about them or fail to take much notice of them.

Then there are other patients who, when the discharge is profuse, will complain of the deep-seated burning pain and of an increased desire to make water. Many of these cases are able to go about and to attend to their duties during the acute and declining stages of their trouble, which is gonorrhœa of the totality of the urethra.

But the symptoms most strikingly indicative of invasion of the posterior urethra are a diminution in the amount of the suppuration or its entire cessation (even when it is profuse and also when it is on the decline), and a decidedly increased desire to urinate. In some cases the cessation of the discharge so pleases the patient that he gives himself little concern about the increased frequency of urination. In these cases by the two-glass test the first and second specimens of urine will be found to be opaque and to contain pus and tissue-elements. In some cases the second specimen is more cloudy than the first. If no complications develop in such cases, the trouble in the posterior urethra may be more or less severe for a time; then in most instances the discharge again appears, either copious or rather scanty, at the meatus; the patient feels much relieved, and the case then behaves like one of anterior urethritis on the decline.

In many cases in which a supposed anterior urethritis is declining in a satisfactory manner the patient will present himself and complain of a frequent and intense desire to urinate, together with pain deep down in the perineum at the end of micturition. By questioning the patient the mode of onset of his trouble will be made clear. He usually begins by urinating in a normal manner; but at the end of the act he experi-

ences a dull pain and weight in the perineum or a short, sharp spasm. This leads him to think that he has not evacuated the bladder, and he then strains, but expels no urine, or at most only a few drops, the passage of which causes still more deeply-seated pain. Thus ushered in, the tenesmus begins with varying degrees of severity. Examination of the urine shows cloudiness in both beakers when the suppuration is profuse, as it usually is in such cases. This desire to urinate may be very frequent and imperative, or the symptoms may be less pronounced. In some cases a patient may go about, while in others he is forced to go to bed. In severe cases a further symptom is added to the patient's discomfort, and this is a more or less profuse hæmaturia. In most cases the blood follows the urine, but in some it appears before it is all voided. There may be but a few drops or the quantity may be very profuse. In some of these cases of hæmaturia in posterior urethritis a small worm-like mass of coagulated blood may be passed in the first jet of urine. This coagulation is formed in the intervals of urination by the escape of blood from the inflamed prostatic urethra. At the end of micturition the prostate and bladder sphincters contract and squeeze the inflamed and eroded lining membrane, thus forcing the blood from it, as we may by squeezing force water from a sponge.

Strange as it may seem, even in very severe and acute cases there is no systemic reaction, there is no fever, and there is, as a rule, no increase in the frequency of the pulse.

There are, therefore, four well-marked symptoms and conditions of posterior urethritis, as follows: frequent and intense desire to urinate; pain in glans penis and perineum at the end of urination; post-micturitional hæmaturia (sometimes absent); absence of systemic symptoms. In addition to the foregoing classical symptoms there are two others—namely, complete retention and incontinence of urine. Temporary retention may occur in the less severe order of cases, due to spasm of the compressor urethræ muscle, and may pass away without the surgeon having to resort to the catheter. Complete retention, due to the same cause, may occur in severe cases in which there is urethral stricture, hypertrophy, or abscess of the prostate. In these cases prompt surgical relief is sometimes imperative.

By the term "relative incontinence" is understood a relaxed or insufficient condition of the compressor urethræ muscle, which fails, even when will-power is exercised, to keep back the urinary stream. This condition is observed in the less severe order of cases. A sudden impulse to urinate overtakes the patient, the bladder contracts, and some urine is expelled, perhaps in the patient's pantaloons. Hearing a stream of water flowing from a faucet or a hydrant or from a watering-cart, and washing the hands, sometimes cause in these patients vesical contraction

and the escape of urine, the compressor urethræ being enfeebled and offering little or no resistance.

In many acute cases we also observe such symptoms as painful erections and pollutions which may be more or less bloody. Pollutions are very significant of involvement of the posterior urethra, since they are due to the irritation of the inflammatory process in the caput gallinaginis. Chordee is not observed, unless the inflammation still remains in the acute stage in the anterior urethra.

In the general run of cases the increased desire to urinate only causes discomfort and not much pain. Such patients generally go about and rest when they can. In other cases the patients' sufferings may be said to be quite severe. Then, again, we sometimes see patients thus afflicted who become objects of the most profound sympathy. While in some patients the desire to urinate may occur every hour or so, in others it occurs every half hour or less. Then in very bad cases the imperious desire comes every few minutes, and in yet worse cases there is no interval: the patient sits over the chamber the whole time, groaning and crying out with pain and drenched in a cold sweat, passing a few drops of bloody urine at a time. The pain is usually of a dull character, and is felt at the end of the act of urination. Some patients complain of pain at the end of the penis before urination, as they do with stone in the bladder. This pain and tenesmus in severe cases radiates to the bladder, anus, lumbar region, spermatic cord, and the hypogastrium. Sometimes these patients also suffer from cramps in the legs. In many cases nocturnal exacerbations are observed. In these very bad cases of acute posterior urethritis the urine in the second glass is more cloudy than that in the first. These patients seem instinctively to know that they suffer less when they pass considerable urine; hence they drink large quantities of water in order to dilute the urine and to render it less irritating.

When the hemorrhage is very severe it escapes in the intervals of urination from the posterior urethra into the bladder, and then the first, and particularly the second, glass will be found to contain blood as well as pus. In such cases there is usually the same terminal flow of blood after urination as has already been described.

When posterior urethritis complicates the condition incident to hypertrophy of the prostate, or when middle-aged or old men, having stricture of the urethra, are attacked with posterior urethritis, their condition is very often alarming and even critical. In such cases the symptoms are very severe and the sufferings of the patients very intense. This combination of acute and chronic disorder is the more dangerous, as it may lead to rapidly-ascending gonorrhœa and an invasion of the ureters and the kidneys.

Albuminuria is a symptom peculiar to severe cases of posterior urethritis. It is severe in proportion to the intensity of the tenesmus, and is said to be caused by the spasmodic contraction of the orifices of the ureters by the detrusor muscles of the bladder, which dams back the urine and leads to the escape of albumin from the glomeruli into the renal tubules.

It will be seen that in acute inflammation of the posterior urethra the symptoms may be slight and insignificant, or they may be severe, and even violent and atrocious.

Duration.—The duration of an attack of posterior urethritis is very uncertain. In the milder forms it may last weeks and months, according to the care taken and the treatment advised. In moderately severe cases one or more weeks, even as many as six, may elapse before a condition of comfort is established, even when the treatment is correct and the care of the patient perfect. In the most severe cases the duration is indefinite. Usually such a violent attack lasts two or more weeks, and then amelioration occurs and the disease becomes less severe and violent.

Declining Stage.—The first symptoms pointing to improvement are the less urgent desire to make water and the greater length of the intervals of urination. Then the local and radiating pains become less, and the patient becomes more comfortable and hopeful. The progress toward recovery in very severe cases is usually slow, and may be interrupted by relapses, which are often brought on by indiscretions of the patient in the matter of alcoholic excesses, sexual imprudences, and bodily strains. In many cases the disease ceases to give the patient concern and settles down into a chronic condition, in which there may be no subjective symptoms whatever. In these cases the discharge is small in quantity and viscid in consistency, and the two-glass test fails to localize the inflammatory process. Resort to lavage of the anterior urethra, however, will show that the posterior urethra is the seat of chronic inflammation.

Nature of the Secretion.—In very acute cases of posterior urethritis the secretion is purulent and profuse, like that of anterior urethritis, and in it the gonococcus can usually be readily discovered. As the process grows older the pus becomes mixed with epithelial cells and is seen in the form of threads.

It is very difficult and often impossible to find the gonococcus by means of the microscope late in the course of posterior urethritis.

Invasion of the posterior urethra menaces the following parts: the verumontanum, the ejaculatory ducts, the ducts of the seminal vesicles, the prostatic ducts, the epididymes and testes, the seminal vesicles, and the bladder. Posterior urethritis, therefore, may be the starting-point

of various complications, all of which are painful and distressing, and some of them are more or less dangerous in their results.

Diagnosis.—The diagnosis of acute posterior urethritis is made by a consideration of the acute attack in the anterior urethra and the typical symptoms of deeper invasion.

Examination of the urine after lavage of the anterior urethra will establish the diagnosis beyond doubt.

Prognosis.—In general, the prognosis of gonorrhœa is good, and a cure may be promised in from three to six or eight weeks, if proper care and treatment are used. But it is well to remember that in some cases gonorrhœal rheumatism, epididymitis, urethrocystitis, and other complications may occur even when a carefully directed treatment is being followed. It may be stated, however, without fear of contradiction, that owing to improved methods of treatment the prognosis in gonorrhœa will grow progressively better in the future. The disease is commonly very obstinate when acquired before puberty, particularly in scrofulous and tuberculous subjects. In plethoric persons, in high livers, and those addicted to drink, in rheumatic and gouty subjects, gonorrhœa is frequently very persistent. In those who are overworked, the subjects of mental worry, and those of neuropathic tendency the disease is often very tedious. Even in healthy subjects, in many cases, the inflammatory process is very rebellious and shows a tendency to become localized in some part of the urethra, and there to tax the bearer's patience and the surgeon's skill.

Urethritis in Young Boys.

Catarrhal Urethritis.—There is a simple non-specific (certainly as to its origin) inflammation of the meatus and the anterior portion of the urethra in young boys. I have seen cases in which a mild urethritis of the distal part of the penis originated in balanitis resulting from great uncleanliness. In like manner the hyperæmia caused by pediculosis, scabies, and eczema of the penis and glans may cause a mild form of purulent urethritis in children, as it does in the adult. In the act of crawling children may get filth on these organs, and from this infection may occur. I have several times seen in boys from ten to thirteen years old well-marked subacute urethritis concomitant with balanitis which originated in efforts to retract the prepuce for the first time and to break up adhesions. In these cases dirt, retained smegma, and urine undoubtedly played a prominent causative part.

The **symptoms** of mild urethritis in young male children are heat, swelling, pain on urination, and a scanty purulent discharge.

The **course** of this disease is tolerably mild and its duration short, provided the exciting causes are removed.

Treatment.—Catarrhal urethritis will promptly cease by the exercise of cleanliness and the use of mild lead injections.

Gonorrhœal urethritis in infants and young boys is not infrequently met with, particularly in the lower classes of society living in localities where children are closely herded together with adults. The disease is found in an endemic, quasi-epidemic, and sporadic form.

Little is known as to the very early stages of this infection, and there are no reliable facts as to the period of incubation.

The **symptoms** are similar to those of acute gonorrhœa in the male. The disease begins violently in heat, redness, and swelling of the penis, from which there is a profuse discharge of pus. The morbid process begins in the fossa navicularis, and promptly runs down to the bulb and into the posterior urethra. There is pain on urination, besides a constant burning sensation in the urethra, and there may be painful nocturnal erections. In the early stage, by the two-glass test, the urine is found to be turbid in the first cylinder and clear in the second; but in most cases the posterior urethra becomes involved, and then the urine in both cylinders is turbid. With the invasion of the posterior urethra the symptoms resemble those of the adult similarly attacked. There is tenesmus, which may be very severe and occur as often as every quarter of an hour in bad cases. In milder cases the desire to make water may occur every hour or at longer intervals. Sometimes mild and even severe hemorrhage may occur at the end of the act of urination. This disease runs the same persistent and rebellious course in the young that it does in the adult, and one or more months may elapse before cure is effected.

Etiology.—It is often difficult, and even impossible, to ascertain the cause and mode of origin of virulent gonorrhœa in an infant under two years of age; but the facts presented by most cases warrant the opinion that the child has been tampered with by an older person and thus infected. Since intromission of the organ is not absolutely necessary for infection, it is probable that in some of these cases depraved women suffering from gonorrhœa place the child's penis in their vulva. Such instances have been known.

The **complications** may be balanitis, lymphangitis, epididymitis, orchitis, and vaginalitis. In some cases chronic posterior urethritis is a result.

The virulent form of urethritis in the young may lead to stricture of the urethra. It is very probable that to virulent urethritis occurring in early life may be attributed many of the cases of stricture in boys and young men in whom a history of recent gonorrhœa cannot be obtained.

Treatment.—The treatment of virulent urethritis of male infants and young boys should be that laid down for adults. The doses, how-

ever, should be adjusted to the patient's age, and the strength of the injections should be tempered in accord with the greater delicacy of the young sufferer's tissues.

MEMBRANOUS DESQUAMATIVE URETHRITIS.

Under the foregoing title a number of cases have been described in which patients passed membranous flakes or cylinders or casts from their urethra. In the cases thus far reported we find a marked variation in the character of the membranes and in the subjective and objective symptoms of the patient passing them.

Though a few cases will not warrant sharply-drawn conclusions, the opinion may be ventured that there are a croupous urethritis and a well-defined epithelial desquamative urethritis, the one being acute, the other chronic.

These cases should be treated on the general lines indicated in the management of chronic anterior urethritis. (See page 83, *et seq.*)

the diagnosis can be readily made. In those cases of balanitis in which the preputial orifice is very small, even of pinhole size, more difficulty may be experienced. By means of intrapreputial injections the discharge may be removed; the parts then being dried, slight pressure upon the urethra from behind forward will reveal the presence or absence of pus in the canal. By means of the microscope we can find gonococci in the pus of gonorrhœa, but it is not found in that of balanitis.

When the initial lesion of syphilis is developed on or within the lips of the meatus a slight mucous discharge is present, and doubt as to its nature may exist up to the period when the diagnosis of chancre is made. The initial lesion may occur at one or more inches down the canal, and give rise to a discharge which is usually seropurulent and scanty. Such patients complain of a localized uneasiness and impediment to urination, and examination reveals a circumscribed thickening of the corpus spongiosum. In these cases the endoscope and the microscope afford much aid.

Gummatous infiltration occurs at any part of the pendulous urethra, and a scanty seropurulent discharge accompanies its development. The absence of inflammatory symptoms, the localization of the lesion, and the history of the patient are usually sufficient for a correct, if perhaps rather delayed, diagnosis.

The mucous fluid which exudes from the meatus when the seat of herpes progenitalis and the presence of vesicles establish the case as not one of gonorrhœa.

The pus of chancroids of the meatus is of a rusty-brown color, differing markedly from that of gonorrhœa. The points in the diagnosis of posterior urethritis have necessarily been given in the description of that condition.

ACUTE POSTERIOR GONORRHŒA, OR URETHRITIS.

When the disease reaches the bulb of the urethra that structure becomes a profusely suppurating pouch, and from it in the majority of cases the morbid process, by cell-to-cell invasion, attacks the membranous and prostatic urethræ.

Symptoms.—In many cases the onset of posterior urethritis is unattended by any marked symptoms, and it is largely by reason of this absence of symptoms pointing to the deep extension of the trouble that the opinion was held that the posterior urethra is invaded in only a minority of cases.

It has been customary to speak of a deep burning pain between the testes and in the perineum as symptomatic of involvement of the bulbous urethra—a contention which is quite correct. But it is equally cer-

tain that this symptom occurs when the infective process has invaded the urethra beyond the triangular ligament. Its import has, therefore, frequently been misconstrued. Acute posterior urethritis, moreover, may exist and gradually decline in the manner and with the same symptomatology that we have seen the infection of the anterior urethra subside. In such cases there has been no suspicion of the invasion of the canal beyond the bulb, and in all probability the two-glass test and lavage of the anterior urethra, followed by the one- or two-glass test, have not been resorted to. Thus it is that many instances of involvement of the posterior urethra have been unrecognized.

If cases of acute gonorrhœa are carefully watched as to their symptomatology and the urine is properly examined, it will be found that in a goodly proportion the only symptoms of posterior urethritis will be a slight burning sensation deep in the canal, particularly after urinating, and a very slight increase in the number of urinations. In many cases these symptoms will only come to light as a result of the care and acumen of the physician, since many patients say nothing about them or fail to take much notice of them.

Then there are other patients who, when the discharge is profuse, will complain of the deep-seated burning pain and of an increased desire to make water. Many of these cases are able to go about and to attend to their duties during the acute and declining stages of their trouble, which is gonorrhœa of the totality of the urethra.

But the symptoms most strikingly indicative of invasion of the posterior urethra are a diminution in the amount of the suppuration or its entire cessation (even when it is profuse and also when it is on the decline), and a decidedly increased desire to urinate. In some cases the cessation of the discharge so pleases the patient that he gives himself little concern about the increased frequency of urination. In these cases by the two-glass test the first and second specimens of urine will be found to be opaque and to contain pus and tissue-elements. In some cases the second specimen is more cloudy than the first. If no complications develop in such cases, the trouble in the posterior urethra may be more or less severe for a time; then in most instances the discharge again appears, either copious or rather scanty, at the meatus; the patient feels much relieved, and the case then behaves like one of anterior urethritis on the decline.

In many cases in which a supposed anterior urethritis is declining in a satisfactory manner the patient will present himself and complain of a frequent and intense desire to urinate, together with pain deep down in the perineum at the end of micturition. By questioning the patient the mode of onset of his trouble will be made clear. He usually begins by urinating in a normal manner; but at the end of the act he experi-

be required as early as it is practicable in the course of the virulent inflammation.

Assuming, now, that we have to treat an acute case, either as a first or a later infection, the most important measure is absolute rest, preferably in the recumbent position, but the majority of patients are unwilling thus to submit. The great advantages to be attained, however, should be thoroughly explained to them. Taking cases, therefore, as we find them, they should be enjoined to walk and exercise as little as possible, to spare themselves in every way, to avoid muscular exertion, to ride rather than walk, to sit rather than stand, and to lie down as often and as long as possible. Horseback riding, bicycling, out-door sports, dancing, jumping—in fact, any form of severe bodily exercise—are to be absolutely avoided. In very bad cases, in which the inflammation is so active that a patient is forced to seek the recumbent position, it is well to apply cooling lotions on lint to the organ or to employ an India-rubber ice-bag. For all itinerant cases in the acute stage a nicely-fitting and comfortable suspensory bandage should be ordered at once. Care should be taken that the opening for the penis is sufficiently large, and that the urethra is not in any degree pressed upon by the bandage.

The patient must be informed of the great virulency of the urethral pus, and that contamination of the eyes with it may result in the loss of one or both of these organs. Therefore the hands should be thoroughly washed immediately after handling the penis. Too much stress cannot be laid upon this injunction.

Careful attention to diet is an important consideration. It should be light and plain and in moderate quantity. All highly-seasoned foods, salads, gravies, soups, and condiments should be absolutely interdicted. Coffee, cocoa, beer, alcoholic liquors, ginger ale, and asparagus should be avoided. The utmost cleanliness of the genital parts should be recommended, using by preference carbolic-acid soap. All sexual excitement must be sedulously avoided, and the patient should be warned against lascivious thoughts and suggestive pictures.

Much care is necessary in adapting dressings to the penis for the purpose of catching the discharge. Patients should be warned not to place pieces of lint or cotton over the urethral orifice, nor to use stockings or bags at the bottom of which a bird's-nest-shaped wad of cotton is placed, since by all of these procedures the pus is injuriously kept against the meatus and glans. India-rubber condoms are also objectionable. The most cleanly and efficient method of dressing the penis is as follows: A piece of old linen or muslin or two thicknesses of absorbent gauze about four inches square, in the center of which is a small oval aperture, is slipped over the exposed glans behind the corona, and the

prepuce is then pushed forward. From its orifice the linen protrudes and catches all of the secretion. (See Figs. 14 and 15.) If the patient has no foreskin thus to hold the bandage, a piece of linen or gauze, four by six inches, may be wound around the whole penis, and there retained by means of a small piece of adhesive plaster or a loosely fitting India-rubber band.

FIG. 14.

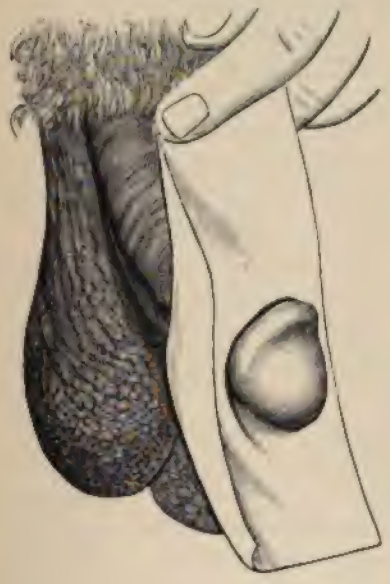


FIG. 15.

Dressings for the penis in acute gonorrhœa.

All these dressings for the penis should after use be destroyed by fire, or at least thrown down a water-closet. The surgeon should emphasize this important prophylactic measure. If practicable, the penis may be suspended by means of the under-clothes along the fold of the groin. The utmost care and delicacy must be observed in handling the organ: squeezing to cause pus to exude is very harmful, and pressure of any kind must be avoided.

During the acuteness of the attack purgation at intervals of three or four days is very essential. For this purpose two to four compound cathartic pills or ten grains each of calomel and supercarbonate of sodium taken at night are excellent. Saline cathartics and the natural cathartic waters are to be avoided, since much of the sulphate of magnesium passes off in the urine and irritates the urethra.

Early in the acute or inflammatory stage of gonorrhœa strong stimulating and astringent injections and oleoresins are contraindicated. The chief object of our therapeusis at this time is to render the urine mode-

Treatment.—Catarrhal urethritis will promptly cease by the exercise of cleanliness and the use of mild lead injections.

Gonorrhœal urethritis in infants and young boys is not infrequently met with, particularly in the lower classes of society living in localities where children are closely herded together with adults. The disease is found in an endemic, quasi-epidemic, and sporadic form.

Little is known as to the very early stages of this infection, and there are no reliable facts as to the period of incubation.

The **symptoms** are similar to those of acute gonorrhœa in the male. The disease begins violently in heat, redness, and swelling of the penis, from which there is a profuse discharge of pus. The morbid process begins in the fossa navicularis, and promptly runs down to the bulb and into the posterior urethra. There is pain on urination, besides a constant burning sensation in the urethra, and there may be painful nocturnal erections. In the early stage, by the two-glass test, the urine is found to be turbid in the first cylinder and clear in the second; but in most cases the posterior urethra becomes involved, and then the urine in both cylinders is turbid. With the invasion of the posterior urethra the symptoms resemble those of the adult similarly attacked. There is tenesmus, which may be very severe and occur as often as every quarter of an hour in bad cases. In milder cases the desire to make water may occur every hour or at longer intervals. Sometimes mild and even severe hemorrhage may occur at the end of the act of urination. This disease runs the same persistent and rebellious course in the young that it does in the adult, and one or more months may elapse before cure is effected.

Etiology.—It is often difficult, and even impossible, to ascertain the cause and mode of origin of virulent gonorrhœa in an infant under two years of age; but the facts presented by most cases warrant the opinion that the child has been tampered with by an older person and thus infected. Since intromission of the organ is not absolutely necessary for infection, it is probable that in some of these cases depraved women suffering from gonorrhœa place the child's penis in their vulva. Such instances have been known.

The **complications** may be balanitis, lymphangitis, epididymitis, orchitis, and vaginalitis. In some cases chronic posterior urethritis is a result.

The virulent form of urethritis in the young may lead to stricture of the urethra. It is very probable that to virulent urethritis occurring in early life may be attributed many of the cases of stricture in boys and young men in whom a history of recent gonorrhœa cannot be obtained.

Treatment.—The treatment of virulent urethritis of male infants and young boys should be that laid down for adults. The doses, how-

In some cases, besides the erections and chordee, there is considerable vesical irritation, with frequent and imperious desire to urinate, together, perhaps, with pain in the perineum, loins, scrotum, and groins, due to the onward extension of the infection. In such cases laudanum, as just advised, may be used, or suppositories may be ordered, as follows:

℞. Morphiæ sulphatis,	gr. ij;
Ext. belladonnæ,	gr. iij;
Ol. theobromæ,	q. s.

To make suppositories No. iv.

One of these may be introduced into the rectum just on retiring, and a second during the night if necessary. In many cases calm sleep may be induced by using the following combination, which is not followed by unpleasant effects:

℞. Potassii bromidi,	℈xvj;
Chloral. hydrat.,	gr. lxxx;
Liq. morphiæ Magendie,	gtt. lxxx;
Syr. simplicis,	
Aquæ,	āā ℥j.—M.

Dose, one teaspoonful in a little water on retiring, and it may be repeated during the night if necessary. In some cases, owing to intolerance, the quantity of all of the active agents may be suitably increased. Bromide of potassium alone proves of much benefit in the milder order of cases.

Antipyrine is very often soothing and beneficial in acute gonorrhœa and in various forms of cystitis. This remedy may also be given in combination with phenacetin; sulphonal and trional may also be of benefit.

The tendency of gonorrhœa being toward disturbance of the nervous system and debility, much care and attention are required in preventing them. Purgation must not be pushed to the extent of weakening the patient; and if signs of falling away show themselves, a rather more liberal diet should be allowed so soon as admissible.

In the florid stage of gonorrhœa, with its profuse yellowish and perhaps bloody discharge, coming from a very highly inflamed and swollen mucous membrane, it becomes a nice question whether one can apply local medication. As the case improves by reason of the general treatment and the immersions of hot boric solution we may then order the patient to keep a portion of this fluid for injection purposes. He should then procure a proper syringe and should be carefully instructed how to use it.

Care should be exercised in selecting a syringe which should hold two or three drachms, should work easily, and its nozzle, which should be perfectly smooth, should fit readily into the meatus. Fig. 16 shows

FIG. 16.

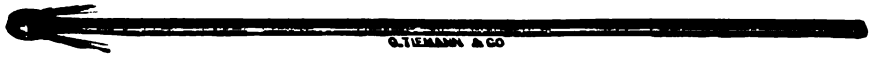
a particularly useful instrument for all cases; its tube is of hard rubber and its nozzle is conical in shape and soft and compressible, being made of soft black rubber.

The technic of injection is as follows: The patient stands with his feet about three feet apart, or he may sit on the edge of a stool, his weight resting on the coccyx. With the forefinger and thumb of the left hand the patient separates the vertical lips of the meatus, while he steadies the penis with the middle finger. The point of the syringe, held in the right hand, being in the meatus, the thumb and forefinger compress the lips together underneath the nozzle, by which manœuvre the reflux of the injection is prevented. In order that benefit shall result it is necessary that the fluid shall reach every portion of the mucous membrane of the anterior urethra, including the bulb, and that the canal shall be somewhat, but mildly, distended in the operation. It is always well for the surgeon to warn patients to proceed slowly and cautiously, being careful to avoid rapid and forcible distention of the canal. It is a good rule to begin with the slow injection of about one drachm of fluid, and then to increase as the tolerance of the urethra will admit, until a syringeful can be thrown in the canal without any resistance whatever. In this way the urethra becomes accustomed to the operation, and its walls can be well acted upon by the medicated fluid.

After each immersion, therefore, the patient may throw four or five syringefuls of the hot boric solution as far down the urethra as he can without discomfort. In most cases with a little practice he soon medicates the whole anterior urethra. As a rule, the treatment alleviates the patient's sufferings and lessens the inflammation. With the onset of amelioration, which usually occurs in a few days, we can adopt a more radical and local treatment. To this end we introduce as far as the bulb e soft and compressible, bulbous-ended soft-rubber reflux catheter, h can be gently passed, without discomfort or any damage, down to ulb, and through it we can slowly throw two, four, or six ounces

of the warm boric solution, which returns and flows out of the meatus. As a result of these procedures the patient becomes much more comfort-

FIG. 17.



Reflux Catheter.

able, and there is a perceptible improvement in the urethral inflammation. When this subsidence of the very acute stage is noted we may go a step farther with our local applications. Thus we may replace the boric solution with warm lead-water, or we may use a warm solution of permanganate of potassium, not stronger than 1 : 4000, or protargol 1 : 200. It is too early to speak definitely of the value of argonin, largin, or argentamin.

It cannot be denied that in some cases of gonorrhœa early in the florid stage permanganate of potassium, when used in the conservative manner here directed, will very much attenuate the inflammatory symptoms; but it cannot be too clearly understood that its sphere of usefulness is in the conditions now indicated, and that it does not act deeply enough to produce a cure. The heroic and indiscriminate use of this remedy which is now so prevalent is very much to be regretted.

Under the mild graduated antiseptic measures here outlined much improvement will be produced as a rule. If, as so often happens, even when care and prudence are exercised, the posterior urethra becomes attacked, it may be well to employ the ordinary velvet-eyed catheter (using very small ones, 10 to 12 of French scale), and to inject some of the fluid into the posterior urethra. These measures reduce the acute inflammation, and in that way render the tissues less susceptible to the action of the micro-organism; then as the treatment is carefully kept up the microbes die, since the condition of the tissues is not favorable to their nutrition. When the acute suppuration begins to subside the patient may be ordered to use injections having as their base various astringents. It should be remembered, however, that the injections administered by the patient himself only medicate the anterior urethra and that the treatment of the posterior segment is to be administered by the surgeon. Medication of the anterior urethra, however, is of very decided benefit.

The drugs generally used for urethral injections are the sulphate, acetate, sulphocarbolate, and chloride of zinc, acetate of lead, sulphate of copper, sulphate of alum and of thalline, muriate of hydrastis, and the white fluid extract of hydrastis. As a broad general rule, all of the above drugs, except the chloride of zinc and sulphate of copper, may be used in the beginning of treatment in $\frac{1}{2}$ or 1 per cent. solutions in water.

The chloride-of-zinc solution should be 1 : 1000 or 1 : 500 to begin with, and if its use warrants its continuance it may be used of the strength of 1 : 200 or 1 : 250. It is always well to proceed cautiously with this drug. The sulphate-of-copper injection should be 1 : 500, and it may be increased to 1 : 100; but if it fails to produce good results in this strength, it is well to discard its use. No reliance can be placed on tannin. The foregoing is a quite generous armamentarium for injections, and all of them may be employed carefully in the beginning of the declining stage.

The following injections may be used, care being taken to dilute them if they produce any uneasy symptoms beyond a feeling of pleasant warmth. For the very first series of injections a solution containing one grain each of acetate of lead and of acetate of alum to the ounce of water will generally prove very acceptable. Other injections are—

℞. Zinci sulphatis, vel acetatis,	gr. vj ad viij;
Liq. Magendie,	ʒij;
Aquæ,	q. s. ad ℥iv.—M.

A combination of sulphate of zinc and acetate of lead forms a very excellent injection, as follows:

℞. Zinci sulphat.,	
Plumbi acetat.,	āā gr. vj ad xij;
Ext. opii aq.,	ʒij;
Aquæ,	℥vj.—M.

℞. Bismuth. subnit. or zinci carbon.,	ʒiij;
Tr. catechu,	
Vin. opii,	āā ʒij;
Glycerinæ,	℥ss;
Aquæ,	ad ℥vj.—M. To be well shaken.

At this time—namely, the declining stage—it is well to leave off the use of the alkaline mixture and to begin the use of the standard anti-blennorrhagics, copaiba, cubebs, and oil of santal, in a sparing manner.

In private practice these remedies should, as a general rule, be administered in capsule form. In default of American productions (which is very singular, when we consider how far we are advanced in the art of pharmacy) we resort to French capsules. Raquin's capsules of copaiba are of especial worth, and three of them may be given as a dose, repeated three times a day. The cubebs and copaiba capsules of Mathey-Caylus are also efficient, and should be given in the same

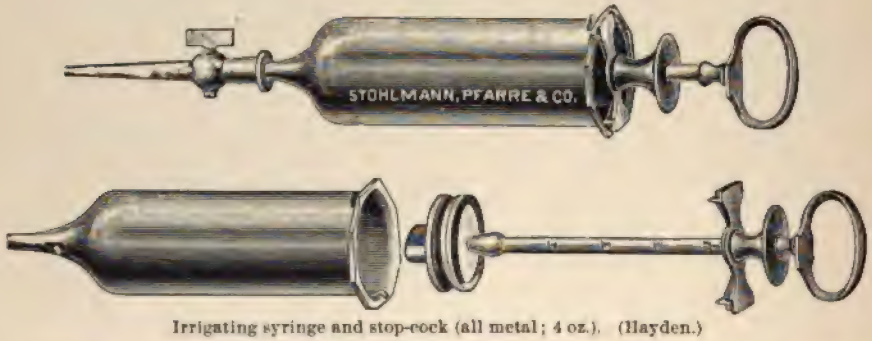
quantity as the Raquin capsules. We have so many excellent capsules of pure oil of yellow santal made in this country that we need not go abroad for foreign productions. In general terms, thirty to sixty drops of oil of santal, divided into three doses, should be given daily, so that, when the capsules contain five drops, six to twelve may be given, or when they contain ten drops, six will usually be sufficient. The dose can be pushed slightly higher; but the surgeon should always look out for the gastric effects of the oil, and should discontinue its use if severe lumbar pain, supposed to be due to renal congestion, is complained of. Salol some years ago was looked upon as the coming antiblennorrhagic, but the general opinion of those who use it is that it is only feebly active or really inert.

The capsules already mentioned, being somewhat expensive, cannot be used in dispensaries and clinics. The combination known as Lafayette mixture is a very good one, and is very largely used in nearly all medical charities. Should these remedies cause gastro-intestinal symptoms or produce erythematous rashes their use should be stopped immediately. At the present time when we act upon gonorrhœa by direct local measures, it is not necessary to use the antiblennorrhagics in such large doses and for such long periods as we did in the past.

When the reparative or declining stage has fully set in the discharge is decidedly less copious and is no longer of greenish color, but is more viscid and of a grayish hue. Under the microscope it is found to consist of considerable pus, fewer gonococci, and much immature epithelium. The presence of these epithelial cells is a harbinger of good omen, for it indicates that nature shows a tendency to repair the damage done and to replace the natural covering of the urethra. In this condition she needs active assistance, and at this time the surgeon can really do valuable work. The pathological indications which present themselves for relief, are: First, to cause the absorption of the round-cell submucous-tissue exudation and the restoration of the tonicity of the vessels; and, second, to produce a new epithelial covering for the urethra. Experience shows that the most reliable and effective agent for this purpose is the nitrate of silver. This agent when skilfully used will in general answer all expectations. By its stimulant action it causes the absorption of the submucous exudate and constringes the vessels; and by its astringent action it acts powerfully and well on the relaxed and catarrhal mucous membrane, and tends to produce on it a new and, in the end, stable epithelium. When, therefore, the symptoms of the patient and the microscopical appearances of the discharge indicate that the morbid process is about to decline—and this may be as early as the tenth or fourteenth day, or as late as the twentieth of treatment—it is our duty to begin the use of this drug. If only the anterior

urethra is involved, we may use the reflux catheter; but if the totality of the canal has been attacked (as it so frequently is), the 10, 12, or 14 French velvet-eyed catheter should be employed. Assuming that only the anterior urethra is involved, the reflux catheter lubricated with glycerin or lubrichondrin is gently passed to the bulb, where it will stop. Then, by means of a Hayden's irrigating syringe (see Fig. 18), irrigation is slowly made, and by it the urethra from the bulb to the

Fig. 18.



Irrigating syringe and stop-cock (all metal; 4 oz.). (Hayden.)

meatus is thoroughly medicated. In irrigating both the posterior and the anterior urethra the procedure is as follows:

The soft-rubber catheter is passed down the urethra until the urine flows, which will usually occur when the instrument has got as far as seven or seven and a half inches down. The bladder being empty, pressure on the piston then throws the injection into the prostatic urethra. It is well now to withdraw the catheter a little until its end is in the membranous urethra; then on pressing the piston gently resistance will be felt and no fluid will flow. This tells the surgeon that he is in the membranous urethra, and that the irritation of his procedure has caused contraction of the compressor urethræ muscle. Then push the catheter inward about half an inch and inject again, when the fluid will pass readily. By this manœuvre the eye of the catheter is placed just at the apex of the prostate and at the very beginning of the prostatic urethra. The injection is then slowly thrown in, and it passes through the whole of the prostatic urethra into the bladder. If only a rather small injection is to be given, about one-half of the contents of the syringe may be used posteriorly. Then, while still pressing the piston, the surgeon gently draws out the catheter, and finds that as its eye passes through the membranous urethra the flow stops again, but is at once resumed when the eye reaches the bulbous urethra, which is then irrigated with the remainder of the fluid. It may be necessary to use one syringeful for the posterior urethra and

another for the anterior. The sensations of the patient and the condition of the urine are the indices for the continuance of the treatment. Usually a feeling of benefit is produced, and the patient desires another irrigation in a day or two. It is always well to proceed very cautiously. If the treatment is well borne and the urine shows a decline in the quantity of pus and mucus, and the epithelial cells show rather more development, then one is safe in going on. It is most important not to give the injections too frequently, and this point will be determined by the sensations of the patient and the examination of the urine.

The first irrigation should consist of two to four ounces of a warm solution of nitrate of silver (1 : 10,000 or 1 : 8000). When the effect is good, the quantity of the silver salt may be slowly and cautiously increased. As a rule, in favorable cases a solution of 1 : 2000 is soon reached and is well borne; then, as improvement occurs, the irrigations may be discontinued and injections of a few drops of solution of nitrate of silver (once a day or once every second day), 1 : 1000, 500, and 250, may be thrown into the anterior urethra or into its totality, according to the extent to which it is involved.

In some cases it may be well to follow the silver-nitrate injections for a few times with hot solutions of sulphate of zinc and of alum, 1 or 2 : 500 of each salt. The patient himself may also use with benefit a zinc and lead injection or of any of the salts previously mentioned.

Just before the final cure there will be found an excess of mucus, which floats as a cobweb-like cloud, in the meshes of which are minute pinpoint- or pinhead-sized granules of pus and epithelium. As the morbid process ceases these granules disappear, and then for a short time there is only a slight excess of mucus, which will, under treatment, soon be reduced to its normal quantity, and then the patient may be pronounced cured.

The treatment thus detailed is very simple and not at all discomforting to the patient, and with growing experience the surgeon will be much gratified with the excellent and permanent results which are produced. By carefully examining the urine, especially the morning specimen, much light is thrown on the progress of the case, and the indications for the frequency and strength of the silver-nitrate solution may thus be learned. In general, it may be stated as the law that so long as there is much free pus and no epithelium in the specimen the solutions should be of the weaker grades; but that as soon as epithelial cells begin to appear the time is ripe for progressive increase in the strength of these solutions.

If this treatment is carefully carried out, the integrity of the mucous membrane is restored and annoying relapses are not suffered from; and it goes without saying that stricture-formation is prevented. Then,

again, it is unnecessary to use the antiblennorrhagics so freely and constantly as we did in years gone by, and this is a material gain for the comfort of the patient.

With the use of the small, delicate catheters no damage whatever is done to the urethra, and the compressor urethræ muscle is not overtaxed and left in an atonic condition.

Treatment of Acute Posterior Urethritis.

In many cases, where the totality of the urethra is involved, the treatment of the posterior segment requires nothing more than the regular treatment for acute anterior urethritis, which has already been described.

In the milder forms of acute posterior urethritis it is well to stop the use of antiblennorrhagics and the employment of injections into the anterior urethra, if they give evidence of producing irritation.

At first, in the severe class of cases, no local treatment should be used. The patient should be put to bed and placed on a milk diet, and he should take the alkaline and hyoscyamus mixture. His bowels should be kept loose by the use of mild cathartics. In many mild and in some severe cases the following mixture will produce much comfort:

℞. Fl. ext. tritici repent.,	
Fl. ext. uvæ ursi,	*āā* ℥iss;
Liq. potassæ,	℥ss;
Tr. opii,	gtt. lxiv to xcvj;
Aquæ,	ad ℥iv.

Dose, one teaspoonful every three or four hours in a wine-glass of water. It is well, in the milder order of cases, to give laudanum in small doses without producing any heaviness and sleepiness, since it calms and soothes the patient and improves his *morale*, which is sometimes much disturbed by the frequency of urination, tenesmus, and hæmaturia. In the very severe cases hot sitz-baths, hot-water bags to the perineum and perhaps over the pubes, together with tolerably strong suppositories of morphine and belladonna, may be used according to the indications. In many cases warm enemata to clear the rectum, followed by an injection of cold water, will be very beneficial. It is a good rule to see that the bowels are rendered free once a day. Patients usually like large quantities of water; therefore Apollinaris, Stafford, Poland, and other waters which have a mildly demulcent effect may be freely allowed. In these cases a moderate amount of alkali is usually beneficial, but too much should not be given.

As in anterior so in posterior urethritis, we should resort to local

medication just as soon as we can do so without discomfort to the patient and increase of the inflammation. It is well, therefore, to begin with irrigations of warm boric-acid solution and to proceed in the manner directed on page 60.

In the severe cases it is well to begin with nitrate of silver in much dilution as early as possible, and to increase the strength of the solution, which should always be hot, until it reaches 1 : 8000 or 1 : 4000. By this time the tenesmus will be much lessened, the irritation less frequent, and the hæmaturia less copious. When these favorable symptoms are progressing it is well to use caution and not to increase abruptly the strength of the irrigation. Later on, warm irrigations of alum, of sulphate of zinc, and of permanganate of potassium may perhaps be useful in giving the parts a rest from the action of the nitrate of silver. Under favorable conditions a cure is produced.

Under no circumstances should sounds or bougies be passed into the bladder at these times, since very much harm may be produced by them. In the declining stage of these mild cases the antiblennorrhagics in moderate doses may be given for a time, but they should never be pushed. The fluid extracts of kava-kava and of buchu are sometimes of seeming benefit in the declining stage of acute posterior urethritis.

In some very bad cases in which the tenesmus is dreadful in its severity and the hæmaturia is copious, when other methods of treatment have failed to give relief, very often results little less than miraculous will be produced by the instillation (see section on Treatment of Chronic Urethritis) of a few drops of a solution of nitrate of silver; 1 : 1000 or 1 : 500 may be given, care being taken that the urethra is not harmed by the passage of the catheter. In using this treatment it is well to be very careful to throw up only a few drops at first, and then watch the result. If, as sometimes happens, the patient's sufferings are calmed, on the next day or on the second day an injection of a larger quantity may be administered. Usually in these cases good will be produced by the 1 : 500 solution, and caution should be exercised in going higher than that standard. But cases will be encountered in which it will be necessary to use stronger solutions, viz.: 1 : 250 or 1 : 125.

Fads in the Treatment of Gonorrhœa.—It is appropriate here to call particular attention to the tendency very prevalent to-day to treat gonorrhœa in the acute stage in a heedlessly heroic manner. We read of cures being produced in five, eight, twelve, and twenty days, and persons not thoroughly versed in the knowledge and treatment of gonorrhœa may be influenced by these dazzling and misleading claims. The scheme of these treatments consists in the use of some antiseptic drug (preparations of mercury, silver, permanganate of potassium, and others), either in very strong solutions or in irrigations given several

times a day, very hot. These treatments certainly cut short the severe symptoms and quite promptly cause the purulent discharge to become mucopurulent. These results are then paraded as astonishing, and cases presenting them are looked upon as having been cured. When these enthusiasts are asked in what a cure consists, they reply, "There may be some little redness of the mucous membrane left and a little sticky discharge, but the patient is all right." It is hard to understand how intelligent men can thus deceive themselves. Many patients thus treated, knowing little of gonorrhœa, consider themselves cured; others see that they are really not cured, and they disappear and their cases are registered on the books as cures. Then, again, in this sticky condition antiblennorrhagics and the usual astringents are used to complete the cure; but if they are successful, the credit is given to the heroic remedy which calmed inflammation and more or less rapidly changed the character of the discharge.

In the majority of these cases there can be no doubt the patients are not in any sense cured. They have been rapidly pushed into the terminal stage, which in many cases has no end. Now, if we study these cases carefully (as, so unhappily, it is our frequent duty to do) in the light of the pathology of the gonorrhœal process and of their pathological course, we see that the treatment has caused a much greater exudative inflammation into the submucous connective tissue than is seen in cases temperately treated, and that the catarrhal inflammation has been brought down from suppuration to the production of a thick mucopurulent secretion. This is shown by the decidedly full, tense, and thickened condition of the pendulous and subpubic urethra, and by the examination of the urine, which, strange to say, is not insisted upon by the authors of these rapid-transit treatments, as they are called. Then the patients, if they have escaped epididymitis, have symptoms of posterior urethritis, urethrocystitis, and often bladder incompetence, and more or less incontinence. They often further suffer from urine-dribbling, which is due to the infiltration into the urethral walls, which prevents the canal from performing the final expulsive acts of urination. As time goes on this exudative process, which involves nearly if not all of the anterior urethra, and perhaps the posterior part also, produces connective tissue, and as a result the canal is more and more constricted, until in some very bad cases a condition bordering on stenosis is left, accompanied by all the distressing conditions incident to blockade of the bladder. This picture is not in one particular overdrawn, but is based on the unbiassed study of cases of acute gonorrhœa which have been railroaded into the terminal stage. It may be claimed by those who advocate this form of treatment that they never see these results. Perhaps they fail to appreciate the deplorable condition the patients

are left in; but, as a rule, these same patients think that they have had enough of that sort of treatment, and have sense enough to go elsewhere.

The Method of Janet.—A treatment of gonorrhœa known as the method of Janet is now attracting considerable attention both in this country and abroad. This treatment is essentially based on the fact that as a result of a certain technic the posterior urethra and the bladder can be injected from the meatus without the aid of a catheter. It is assumed that the catheter may not only act as an irritant, but that it is a fruitful source of infection. Janet uses an irrigator or a fountain-syringe, to which is attached about six feet of India-rubber tubing of 30 F. calibre. Into the distal end of this tube a goodly-sized conical glass nozzle is inserted, while an India-rubber stopcock completes the apparatus. The reservoir for the injection, whatever it may be, is elevated above the patient about two feet when the anterior urethra only is irrigated, and about four and a half feet when the posterior urethra and bladder are medicated. The patient, after urination, is placed on his back and the conical nozzle is well, but not forcibly, introduced into the meatus; then the current is allowed to flow.

If irrigation of the anterior urethra is practised, the stopcock is so held that the return current may run out of the meatus; when the deeper urethra and the bladder are to be irrigated the nozzle is firmly held in the meatus.

In some cases, after a little resistance, the compressor urethræ muscle and the feeble external sphincter yield, and the injection flows through the posterior urethra into the bladder. If the operation causes a desire to urinate, the patient should be allowed to evacuate the bladder, and then the irrigation should be repeated. For the abortive treatment of acute anterior urethritis one or two irrigations daily are necessary. For gonorrhœa of the totality of the urethra, for the first few days two irrigations daily are given, and after that only one each day.

The therapeutic agent employed by Janet is permanganate of potassium dissolved in warm water. The solutions vary in strength from 1 : 1000 of water to 1 : 4000. Toward the end of treatment, with the decline of the acute symptoms, the strength may be 1 : 500. For the irrigation of the anterior urethra about one pint of injection may be used, while for the bladder two lavages or irrigations of about a pint each may be introduced.

By this treatment Janet claims that he not only aborts incipient gonorrhœa, but promptly cures cases in the acute purulent stage. The noticeable effects of these irrigations, as stated by Janet are—first, the appearance of a whitish secretion, which soon becomes serous, and then an almost absolute dryness of the whole urethral canal. In unsuccessful cases after this dry stage the discharge again becomes purulent, in which

case these lavages should be discontinued for eight days and then resumed. Janet says that on an average ten or eleven irrigations are sufficient to abort incipient cases, and nine for other acute cases; but in general the patient is cured by five lavages. As to the stability and validity of the cure, we find these significant words: "Sometimes there remains a slight mucous secretion;" "at other times the patient has a slight mucous discharge, in which case I gave a little irrigation of nitrate of silver, 1 : 2000, in the anterior urethra." It is astonishing how complacently exploiters of abortive treatments with uniformly favorable results look upon these mucous secretions and fail to appreciate their gravity.

This treatment of Janet must, of necessity, be administered by the surgeon, to whom the patient must come once or perhaps twice a day, morning and evening.

The So-called Ideal Substitutes for Nitrate of Silver.—For my part, I hold to the opinion that when it is carefully used by a person of considerable experience, nitrate of silver is the ideal agent in the treatment of gonorrhœa in nearly all stages, as indicated in the text. Many substitutes, however, have been proposed, and, although at first they were much praised, most of them have incontinently failed and have passed into oblivion. They come and they go, but they all have advocates at first (*De novis nil nisi bonum*).

In order to be up to date, however, and not to appear remiss, it is necessary to mention some of these agents which it was expected would revolutionize the treatment of gonorrhœa. Argentamine was some time ago recommended in solution 1 to 500, 1000, and 4000, and, like argonin, 5 to 100, is to-day virtually discarded. Largol, nargol, and citrate of silver have had their vogue and are therapeutical curiosities. Ichthyol and ichthargan were proclaimed as true destroyers of the gonococcus, but in practice they proved impotent. Albargin still has a few advocates. Protargol has had some considerable vogue, but like all these hybrid essentially albuminous nitrate of silver specifics it is a tame and diluted agent as compared with nitrate of silver.

The latest substitute in local antiblennorrhagic therapeutics for nitrate of silver is argyrol or silver vitelline, and it is used in varying strengths of from 2 to 5, even 10 per cent. solutions. It has been carefully and thoroughly tried in my clinic, and the verdict is that it produces no effect that cannot be gotten from mild solutions of nitrate of silver.

Medical men, particularly the younger ones, are always on the lookout for some gonorrhœal specific. I place the foregoing list before them for their study and delectation.

These preparations, mostly patented, are all so extensively and persistently advertised that I have not thought it necessary to occupy space with their full description.

CHAPTER V.

CHRONIC ANTERIOR AND POSTERIOR GONORRHŒA, OR URETHRITIS.

In the terminal stage of gonorrhœa the inflammatory process in very many cases becomes localized in some part of the urethra, and there remains in a latent or dormant state. There are a number of conditions which tend to render the course of gonorrhœa chronic. In the first place, there is the natural tendency of the disease to linger indefinitely in the tissues. As we have already seen, gonorrhœa is not a simple superficial catarrhal condition, but a strongly-marked exudative and catarrhal inflammation which is very rebellious to our best-directed efforts in treatment. Then, again, many patients consider themselves cured just as soon as the discharge ceases, and will submit to no further treatment, though examination of the urine shows the presence of tissue-exudates. Another and a prolific cause of chronic gonorrhœa—or gleet, as it is called—is sexual and alcoholic indulgence during the decline of the chronic stage. Still another cause of the indefinite perpetuation of the disease is a too active or protracted treatment by antiblennorrhagics and injections. Many cases of chronic urethritis are due to the prolonged physical exertion incident to the patient's occupation. Chronic urethritis may be localized to the anterior urethra. Its symptoms are the morning drops—the pus-accumulation of the night—which may be small in quantity and greenish-white in color. There may be a minute drop, a large pea-sized drop, or three or more drops. In other cases there is simply gluing of the lips of the meatus together, on the separation of which a film of glairy mucopus is seen. In other cases there is not sufficient secretion to produce a drop. In a third class of cases there is simply increased moisture at the meatus, and a scanty colorless secretion, like glycerin, may be expressed by a little pressure.

There can be no doubt that in most cases of the morning drop there is an inflammatory focus in the anterior urethra; but it does not by any means follow that the posterior urethra is healthy, since it is frequently the more active focus of trouble. In former years gleet meant, in general terms, chronic anterior urethritis, and the treatment was based on that diagnosis. To-day we know that chronic gonorrhœa of the posterior urethra is a quite common affection, and that it may exist alone or in combination with localized anterior urethritis.

A frequent combination is posterior urethritis with inflammation of the bulbous urethra. Chronic inflammation of the urethra at the peno-scrotal junction may exist alone or in combination with posterior urethritis.

In general terms it may be said that the morning drop is indicative of trouble in the pendulous urethra, the secretion of which flows toward the meatus during the night. During the day the secretion may not be noticeable, owing to the quite frequent flushing of the urethra by the urine.

In many of these cases of chronic anterior urethritis all discharge ceases to be seen at the meatus, and the true state of affairs can only be ascertained by the examination of the urine, or by the use of the endoscope. If distinctly limited to the anterior urethra, the urine in the first glass will contain threads or masses of tissue-products, and that in the second glass will be clear. In all cases, however, the examination should be pushed still farther: the anterior urethra should be carefully and fully irrigated, and then the urine should be passed into one or two glasses. In the fluid which has been used in irrigation will be found the products of inflammation of the anterior urethra, and in the first glass those of the posterior urethra if it is the seat of inflammation.

In the bulbous urethra the gonorrhœal process shows a marked tendency to become chronic, and its persistency causes it to be very rebellious to treatment. In this part of the urethra the vascular supply is so great, the tissues are so succulent, and we may say relaxed, that every condition favorable to chronic inflammation is present.

Chronic urethritis of the bulbous urethra may give rise to no secretion visible at the meatus. Then, again, the pus may be so copious and fluid in consistence that it may glue up the meatus in the morning and perhaps during the day, or may escape once a day or oftener as a decided drop. Owing to the fact that the bulbous portion is in direct continuity with the membranous urethra, this portion may be the seat of hyperæmia or inflammation in bulbous urethritis.

A chronic discharge, usually small in amount and viscid in consistence, may be developed as a result of chronic gonorrhœal inflammation of the glands of Littre and the crypts of Morgagni. In these cases the lacuna magna and other large follicles may be the seat of inflammation. Chronic follicular urethritis is usually uncomplicated with posterior urethritis. It is found on the lips of the meatus, just within that orifice, and as far down as the bulb.

Chronic inflammation of Cowper's glands has been known to cause a discharge into the urethra which was intermittent in character. In some cases of chronic anterior urethritis the patient suffers no inconvenience whatever. In a few cases the patients complain of pain localized at some part of the urethra.

Chronic posterior urethritis follows in many cases the subsidence of the acute process. Owing to the complexity of structure of the posterior urethra the symptomatology of this affection is often quite well marked. When there is simply uncomplicated chronic inflammation of the mucous membrane the symptoms may be negative or very slight in character.

It is very important to emphasize the statement that many cases of chronic posterior urethritis are much prolonged by reason of a coexistent chronic catarrhal prostatitis (see sections on this subject, p. 288), and chronic inflammation of the verumontanum. The same statement applies to the seminal vesicles. Not infrequently these structures are invaded during the course of acute gonorrhœa of the totality of the urethra, and on the decline of the process chronic posterior urethritis is left, together with a chronic inflammation of the seminal vesicles. It is most important in all cases of chronic posterior urethritis to ascertain whether these deep-seated conditions exist as complications.

In chronic urethritis distinctly limited to the posterior urethra there is usually no escape of pus into the anterior portion, for the reason that it is small in quantity and viscid in consistency. There are, however, border-line cases in the extreme terminal stage of the acute affection in which the pus is still rather copious, and it escapes through the membranous urethra and passes toward the meatus. The compressor urethræ muscle does not usually contract the lumen of the urethra to a hair-sized calibre, as claimed by some authors, and in general it is a moderately patulous canal at this point. There certainly is not, in the majority of cases, such a tonicity of the compressor urethræ muscle as will keep back a quite copious discharge. While in many cases, owing to its small quantity, the pus may be retained in the posterior urethra by the cut-off muscle, in some cases it certainly is not thus dammed backward. The cases of chronic posterior urethritis in which a discharge reaches the meatus are very rare, but they occur.

In very many cases of posterior urethritis, there being no visible discharge and the patients complaining of no symptoms referable to the deep urethra, the affection remains dormant and unrecognized. Thus the cases may drag on for one or more, or even five, ten, and twenty, years without giving any indication of lurking trouble. In some of these cases an exacerbation occurs, and then the patient realizes that he has had an uncured gonorrhœa.

In some instances the exacerbation of the posterior urethritis is subacute in character, attended only with mild or insignificant symptoms, and its presence would not be suspected or sought for had not an attack of epididymitis or epididymo-orchitis developed as a complication. In many cases of this deep-seated urethritis, in which epididymitis or epi-

didymo-orchitis was developed in the initial attack, recrudescences in the testicular trouble are frequently developed at late and remote periods as a result of an exacerbation in the posterior urethritis.

In somewhat rare instances chronic posterior urethritis, usually as a result of excesses, becomes developed into a true acute attack with all its symptoms and its discomforts. It may thus run its course; but in some cases the inflammatory process extends forward into the anterior urethra, which also becomes the seat of an acute phlegmasia. In these cases, when the discharge is well established in the anterior urethra, the sufferings of the patient, experienced when the posterior segment alone was affected, cease, and the case then takes on the features of a gonorrhœa of the totality of the urethra in its declining stage.

What has already been said as to the means of recognizing the existence of acute posterior urethritis applies with equal force to the diagnosis of the chronic affection. In this connection it is well to remember that small, comma-like fleecy plugs or threads, which are thought to be formed in the excretory ducts of the prostatic glands and voided with the last drops of urine, being pressed out by muscular and prostatic contraction, are quite diagnostic of chronic posterior urethritis.

Symptoms.—The symptoms of chronic posterior urethritis are many and varied, mild and severe.

Cases of this affection may be, for purposes of study, separated into groups according to the nature and severity of their symptoms.

There is found in practice a goodly number of cases in which a frequent desire to urinate and some uneasiness at the end of the act, and sometimes at its beginning, are the only symptoms complained of. In some of these cases the increased frequency in urination is not much above normal; in others it is well marked. In some cases the pain is slight and mild, or of a quick, stabbing, but very ephemeral character. In others it is dull, heavy, perhaps spasmodic, and radiates into the rectum, pelvis, testes, and groins. In these cases the act of urination may go on smoothly, or it may be interrupted by slight or severe spasm of the compressor urethræ muscle or of the detrusor vesicæ muscles. This condition has been called "cystospasmus." It is liable to occur after coitus or difficult defecation. In other cases there is no disturbance of urination at all, but patients complain of dull or aching pain in the perineum, deep in the pelvis and prostate, and in the rectum. Sometimes these patients complain of pain over the pubes and of uneasy, vague pains in the cord and testes. In some cases mild and even severe neuralgic pains are complained of in the loins, groins, and thighs. These painful symptoms, particularly when severe, are fortunately not continuously present. They vary from day to day, so that the patient has intervals of comparative comfort.

Perhaps the most serious and, for the physician, trying cases of posterior urethritis are those in which the prostate and its sexual apparatus are involved and there is some disturbance of the sexual function. Some patients complain of a severe stabbing pain at the moment of, or after, ejaculation of the semen. Others state that all pleasurable sensations are either absent or lessened in degree in sexual intercourse, and they are thereby much worried. In still other cases the ejaculations occur before intromission or shortly afterward.

In some cases pollutions are frequent, and with their occurrence a diminution in the sexual appetite is felt. Many of the patients become weak, nervous, and apprehensive. Their digestion becomes poor, and they suffer from constipation. Then the passage of a hard fecal plug presses on the prostate and expels the accumulated mucopus, which appears at the meatus, causing the patient to think he is losing semen. In some of these cases some of the secretion of the seminal vesicles is at the same time expelled, and this also to many is convincing proof that they are suffering from spermatorrhœa. Occasionally these patients are much alarmed at the occurrence of bloody pollutions, which are due to great hyperæmia of the ejaculatory ducts. In any of these cases of disturbance of the sexual function we are liable to find more or less deterioration of the health. This may consist simply of weakness and lassitude, and it may be a condition of great nervousness, of melancholia, or even of true neurasthenia. Between these two extremes there are many degrees of bodily and mental debility.

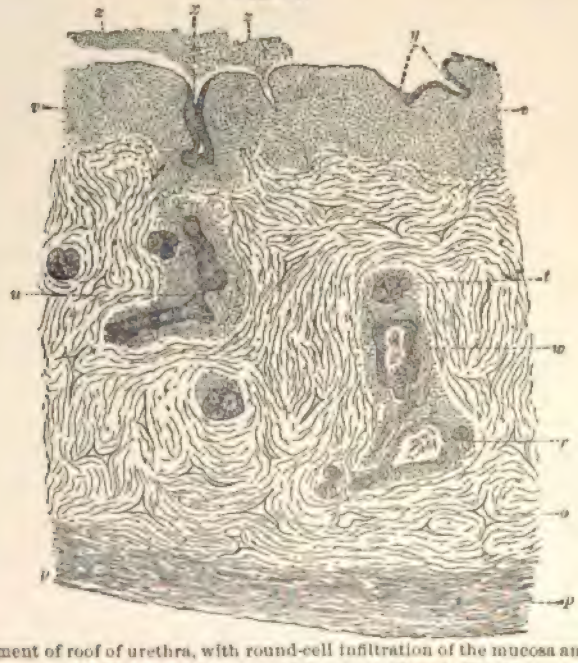
Pathology.—Gonorrhœa not only produces a chronic catarrhal condition, but also a severe exudative inflammation in the submucous connective tissue results, which has a tendency, if the process persists for a long time, to damage the urethra permanently. Such an exudative inflammation induced by the gonococcus is attended first with a desquamation of the urethral epithelium, and when this epithelium is restored it is liable to be more or less thickened and to have a different character from the normal epithelium of the urethra. In other words, the normal cylindrical epithelium of the urethra becomes destroyed by the gonorrhœal process, and is on healing replaced by flat pavement-epithelium. These epithelial proliferations are seen by the endoscope to appear like granular and warty patches, and even polypoid growths. When old they may present a whitish, opaque appearance resembling cicatrices. Then, again, the exudative inflammation attending gonorrhœa may produce ulcers or erosions, and frequently induces a formation of connective tissue in the walls of the urethra. The mucous glands may also be considerably changed. Figs. 19 and 20 show the character of the gonorrhœal inflammation, and Fig. 21 illustrates some of the more important sequelæ of chronic gonorrhœa.

FIG. 19.

Showing a transverse section through the entire urethral canal and tunica albuginea, with round-cell infiltration around urethra and mucous follicles.

Figs. 19 and 20 were taken from sections of the urethra of a subject who had had chronic gonorrhœa for some months. In Fig. 19 the topographical distribution of the inflammation is shown in a section through

FIG. 20.



Showing a segment of roof of urethra, with round-cell infiltration of the mucosa and tubular ducts of follicles; higher magnifying power than in Fig. 19.

the entire thickness of the urethral canal, including the tunica albuginea. The whole folded lumen of the urethra is surrounded by a deep ring of small round-cells (*z*), which seem mainly to have come from the superficial vessels of the mucosa, while a part of them may be proliferated connective-tissue cells. The epithelial lining of the urethra is desquamated, and is entirely absent in places (*x*, *x*, *x*), while in other places (*y*, *y*) it is still in proper position, although infiltrated with pus-cells. In the roof of the urethra, in this section, the ducts of the mucous glands at various depths are also surrounded by a heavy infiltration of small round-cells, which indicates an extension of the inflammation along the mouths of the glands from the surface of the urethra (*w*, *w*).

FIG. 21.

Showing an exulceration of the urethra, with round-cell infiltration-bed and absence of epithelium; newly-formed capillaries in red.

Fig. 20 shows the invasion of the urethra by the gonorrhœal process still more plainly. The drawing includes the whole thickness of a segment from the roof of the urethra, corresponding to the rectangular area indicated by *p*, *q* in Fig. 19. With this higher magnifying power in Fig. 20 the infiltration of the mucosa and tissue surrounding the tubular ducts of the mucous glands is shown in detail. With the exception of the patches denoted by *x* and *y*, the epithelial lining of the urethra is absent, so that there are extensive areas of erosion of the infiltrated mucosa.

Lying free in the urethral lumen near the denuded surface is a flake of the gonorrhœal exudation (*z*, *z*, Fig. 20). This flake is quite identical in structure with the ordinary gonorrhœal discharge as seen on a cover-glass, and consists mainly of pus-cells lying in a fluid or granular

matrix. The mucosa just beneath what is left of the epithelial lining is very densely crowded with small round-cells to the extent shown in the figure at *r*, *r*.

In the same way the ducts of the mucous glands *u*, *w*, and *r*, and in places the gland acini themselves (*t*), are similarly infiltrated with the small round-cells. The ducts *w* and *r* have their lumina partially filled with desquamated cells and granular material.

These figures (19 and 20), then, serve to show that when gonorrhœa has become chronic it must necessarily take a long time for the disease to heal, since in the affected regions of the urethra all this desquamated epithelium must be restored, and the infiltration of small round-cells be absorbed before the urethra can become healthy again.

Among the most important sequelæ of gonorrhœa are ulcers or erosions of the urethra, which are, as a rule, small and sharply localized. Fig. 21 shows a longitudinally situated narrow linear ulcer from the middle of the penile urethra. The section was cut transversely through the urethra. As far as the structure of this ulcer is concerned, it needs but little description, for it does not differ essentially from minute ulcers elsewhere in the skin or mucous membranes approaching the skin in structure. At the site of the ulcer the epithelium is deficient; there is a fairly circumscribed collection of small round-cells, interspersed with newly-formed capillaries, which tend to pass up vertically toward the surface. In a word, the ulcer has a bed of granulation-tissue.

The practical importance of such a condition of the urethra is that it tends to persist almost indefinitely, and keep up a discharge which appears as a scanty gleet or a discouragingly prolonged appearance of gonorrhœal threads.

The morbid process in chronic posterior urethritis is essentially the same as that which affects the anterior urethra—namely, a small-cell exudative inflammation into the submucous connective tissue. This small-cell infiltration may be superficial and only involve the connective-tissue layer, or it may extend deeper into the structural parts of the prostatic urethra. In the superficial form of infiltration the lesion only involves the upper layers of the subepithelial connective tissue, and does not result in much condensation of the membrane. In the deeper form the whole subepithelial stratum is involved, and the caput gallinaginis, the sinus pocularis, the openings of the ejaculatory ducts, and the glands of the posterior urethra may also be more or less implicated in the cell-infiltration, and their structure and function more or less damaged and impaired. All these structures may be invaded in precisely the same manner as the racemose mucous glands of the anterior urethra are.

Where the cell-infiltration is very extensive and deep, the prostatic

urethra becomes more or less callous and dense. The picture seen by the naked eye of chronic posterior urethritis is sometimes a granular condition due to epithelial thickening, and perhaps a slightly warty condition due to the presence of minute new vessels covered with thickened epithelium. In later stages the caput gallinaginis is seen to be enlarged and covered by callosities formed by the heaping up of pathological epithelial layers. As a result of these lesions we find evidences of a persistent desquamative catarrh. Owing to these changes the dilatability of the prostatic urethra is somewhat impaired, and its lumen is perhaps slightly impinged upon by the epithelial thickening and by the increased size of the caput gallinaginis; but there is no such condition (though the parts may have even become cirrhotic) of stricture, such as we find in the anterior urethra.

Morbid Changes Seen by Means of the Endoscope.—The pathological appearances of chronic urethritis, as revealed to the eye, are quite varied, and in the main striking.

By the use of the endoscope the morbid appearances of the urethra are well shown. In general it may be said exploration of the urethra by the endoscope should be confined to the anterior urethra, which may thus be examined without damage and detriment to the patient. The condition of the posterior urethra can be so well determined by the examination of the urine and by rectal exploration of the prostate, and in many cases by a consideration of the symptoms, that endoscopy, which is (except to skilled experts) a difficult procedure and often followed by local injury, should only exceptionally be resorted to.

Chronic urethritis of the follicles shows itself in small deep-red pus-oozing spots of the size of a pinhead to that of a pea. The lacuna magna and similar crypts may thus show evidence of inflammation, or the orifices of the follicles of Littre may be involved.

The most constant morbid condition seen in chronic anterior urethritis is a rather deep-red, even purplish, color of the mucous membrane, which is more or less thickened and velvety. This redness may involve a segment of the canal or a limited portion on one or two sides of the canal. In these cases more or less pus, thin or inspissated, may be seen in the examination. Thickened red circumscribed spots or plaques of chronic inflammation are very common. The next appearance quite commonly seen is called by some granular urethritis. The membrane is thickened, red, even purplish in streaks, and rough and studded with small projections, which consist either of epithelial hyperplasia or of little eminences caused by the growth of new capillary vessels. This condition is frequently found in the bulbous urethra and also in the pendulous portion.

A further advanced form of this granular urethritis is called papillomatous urethritis, in which minute but distinctly defined raspberry-like

masses of new growth are scattered over a segment of the canal. In some cases there may be but one tuft of papilloma, and in others there may be many such. These little new growths are formed of round-cell infiltrations, new capillaries, and epithelial hyperplasia. They are usually found a few inches from the meatus and as far down as the bulbous expansion of the urethra. Since the most careful passage of a soft bougie or catheter in cases of papillomatous urethritis will often cause slight bleeding, the occurrence of this symptom may lead to a suspicion of its cause.

Erosions and ulcerations of the urethra are frequently the cause of chronic urethritis. In the erosive form the mucous membrane is thickened and red, and in spots the epithelium is seen to be lost. Ulcers of the urethra are usually small and sharply limited, and the evidence of loss of tissue can be clearly made out. The erosive form and the ulcerative form of chronic urethritis may coexist, and may involve only a limited portion of the urethra. Then, again, we sometimes see involvement of a considerable segment of the canal in redness and swelling, which is studded here and there with erosions and ulcers and granular and papillomatous growths.

The morbid appearances of the mucous membrane of the posterior urethra are not conspicuously striking. They consist of thickening, more or less papillation, together with increased redness. Frequently the caput gallinaginis and the orifices of the prostatic ducts are seen to be swollen. The underlying pathological process is precisely similar to that of the anterior urethra. In the threads which contain pus and epithelium of various kinds, gonococci are rather infrequently found.

CHAPTER VI.

TREATMENT OF CHRONIC ANTERIOR AND POSTERIOR GONORRHŒA.

WHEN gonorrhœa, or urethritis, has lasted beyond four months, and is then in a decidedly subacute condition, it may be called chronic.

In the treatment of chronic gonorrhœa the history of the case must be carefully considered. Then it is necessary to determine the seat and extent of the morbid process and its nature and physical character. In every case the first diagnostic points should be obtained by the careful examination of the urine. At the first examination instruments for diagnostic purposes should be guardedly used.

The disease lurks, particularly in very chronic cases, in various parts and exists under different conditions, so that there are scarcely two cases which thoroughly resemble each other. The consequence, therefore, is that there is no specifically routine treatment for chronic urethritis, but each case must be treated on the basis of its morbid process and of the therapeutic indications presented by it.

The duration of the urethritis has an important bearing upon its treatment. Let us first consider the cases in which the disease has lasted only a few months. Such patients may complain only of the morning drop, or they may state that they seem well so long as they use an injection, abstain from coitus, and do not drink beer and alcoholics or eat highly-seasoned food. When they cease injecting and indulge in creature comforts and excesses, the morning drop reappears, with perhaps a more or less profuse discharge during the whole day. Examination of the urethra in these cases shows a catarrhal and exudative condition from the bulb forward, perhaps nearly to the meatus. In many of these cases the posterior urethra is also involved. The morning urine is rather cloudy, like turbid cider, contains much mucus, and some long thin or thick threads (sometimes three or four inches long). There may or may not be a few gonococci present. In these cases the best treatment is irrigation of the anterior and posterior urethræ, using at first warm solutions of alum and sulphate of zinc, beginning with a strength of 1 : 500, and increasing according to the result obtained. Usually one irrigation daily is sufficient, but perhaps two may be well borne. The sensations of the patient and the condition of

the urine are infallible guides as to the required frequency of treatment. As a general rule, after one or two weeks' treatment these irrigations seem to lose their efficacy, having done some good, but not having produced a cure. Perhaps in these conditions permanganate-of-potassa irrigations (always quite hot), 1 : 1000 or 1 : 2000, may bring about a cure. If this remedy fails, we resort to nitrate of silver, beginning with solutions of the strength of 1 : 16,000 or 1 : 8000, and sometimes even weaker : and this usually brings about a cure if the treatment is carefully administered. If the morbid process is more severe in the anterior urethra, the bulbous reflux catheter (see Fig. 15) should be introduced as far as the bulb, one or two hand-syringefuls of the irrigating fluid should be injected. The posterior urethra should then be similarly treated. Sometimes it is necessary to finish with quite strong, deep injections. In these cases much pain is frequently produced by the passing of sounds, particularly of large ones. This fact should always be borne in mind, since many patients thus treated suffer severely, while in others the disease is so aggravated that it is most difficult to cure. Some of these cases are rendered practically incurable even if the most judicious and prolonged treatment is followed. Too much attention cannot be paid to the fact that in some cases of chronic gonorrhœa sounds may be productive of incalculable harm.

When the disease is limited to the bulbous portion, where it shows a great tendency to remain indefinitely, the retrojections of alum, sulphate of zinc, and nitrate of silver may be used. These injections will materially modify the morbid process, and sometimes cure it, but they often fail to bring about a thorough cure. In that event it is well to make direct local application of solutions of nitrate of silver, beginning with a solution of 1 : 2000, and perhaps going as high as 1 : 250. These

Fig. 22.

Author's syringe.

injections may be given by means of my syringe which is very easily worked, having a ring and shoulders for the thumb and fingers, and a very conical nozzle, which will fit into any small soft catheter. The piston is marked with numbers to regulate the drops. The injecting medium is any well-made soft-rubber catheter, 10 to 12 or 14 French, cut off to measure eight and a half inches in length, or the reflux catheter may be used. When the catheter is introduced six or six and a

half inches, its end is in the sinus of the bulb, and the very slight impediment it encounters there shows the operator that he is just at the opening in the triangular ligament. The little catheter being slowly passed, never causes pain or irritation. Then ten or fifteen drops of the silver-nitrate solution may be thrown into the urethra. This treatment may be administered by the surgeon every five days or twice a week, and perhaps oftener if the indications of the case point to the necessity of increased frequency. In the intervals the patient may use mild stimulant and astringent injections by means of the penis-syringe. This form of chronic urethritis being very rebellious, it is sometimes necessary to pass an endoscopic tube down to the bulb, and having ascertained the morbid appearances, to apply sparingly on cotton at the end of an applicator a strong solution of silver nitrate (gr. 30 to ℥j water).

In the more chronic cases of anterior urethritis we find spots, patches, and areas of inflammation at the penoscrotal angle (sometimes seemingly caused by the pressure of the suspensory worn during the declining stage) and in the pendulous urethra as far as its beginning.

The first essential in the treatment of these cases is to locate the trouble and to determine its nature.

Now, it must be distinctly understood that all of the above-mentioned inflammatory conditions cause a greater or less thickening of the urethral walls, and they impinge more or less upon its calibre. There is a very prevalent tendency nowadays to call any condition which may interfere with the easy passage of the *bougie à boule* forward or backward a stricture, and thousands of men have been cut for stricture when they had only one or more of the above-mentioned conditions. A little thickened patch of infiltrated mucous membrane, perhaps seated on one side of the canal or perhaps encircling it, will prove an obstacle to the easy-sliding forward and backward of the bulb, and the case might be mistaken for one of annular stricture of large calibre. An ulcer or erosion with its concomitant thickening will offer some resistance, and the bulb on its return may jump and jerk over it. The epithelial hyperplasias which often accompany submucous infiltration jut up in the canal and more or less narrow its calibre and impair its suppleness. A swollen follicle may act in a similar manner. Papillomata will offer more or less resistance, but as they bleed so readily even on gentle manipulation, their nature may be suspected. All inflammatory conditions render the urethra, particularly its pendulous portion, thickened, less supple, and more or less impinge on its calibre and destroy its expansibility. Bearing these facts in mind, it is a very serious matter to decide without full painstaking examinations that a man has stricture.

masses of new growth are scattered over a segment of the canal. In some cases there may be but one tuft of papilloma, and in others there may be many such. These little new growths are formed of round-cell infiltrations, new capillaries, and epithelial hyperplasia. They are usually found a few inches from the meatus and as far down as the bulbous expansion of the urethra. Since the most careful passage of a soft bougie or catheter in cases of papillomatous urethritis will often cause slight bleeding, the occurrence of this symptom may lead to a suspicion of its cause.

Erosions and ulcerations of the urethra are frequently the cause of chronic urethritis. In the erosive form the mucous membrane is thickened and red, and in spots the epithelium is seen to be lost. Ulcers of the urethra are usually small and sharply limited, and the evidence of loss of tissue can be clearly made out. The erosive form and the ulcerative form of chronic urethritis may coexist, and may involve only a limited portion of the urethra. Then, again, we sometimes see involvement of a considerable segment of the canal in redness and swelling, which is studded here and there with erosions and ulcers and granular and papillomatous growths.

The morbid appearances of the mucous membrane of the posterior urethra are not conspicuously striking. They consist of thickening, more or less papillation, together with increased redness. Frequently the caput gallinaginis and the orifices of the prostatic ducts are seen to be swollen. The underlying pathological process is precisely similar to that of the anterior urethra. In the threads which contain pus and epithelium of various kinds, gonococci are rather infrequently found.

CHAPTER VI.

TREATMENT OF CHRONIC ANTERIOR AND POSTERIOR GONORRHŒA.

WHEN gonorrhœa, or urethritis, has lasted beyond four months, and is then in a decidedly subacute condition, it may be called chronic.

In the treatment of chronic gonorrhœa the history of the case must be carefully considered. Then it is necessary to determine the seat and extent of the morbid process and its nature and physical character. In every case the first diagnostic points should be obtained by the careful examination of the urine. At the first examination instruments for diagnostic purposes should be guardedly used.

The disease lurks, particularly in very chronic cases, in various parts and exists under different conditions, so that there are scarcely two cases which thoroughly resemble each other. The consequence, therefore, is that there is no specifically routine treatment for chronic urethritis, but each case must be treated on the basis of its morbid process and of the therapeutic indications presented by it.

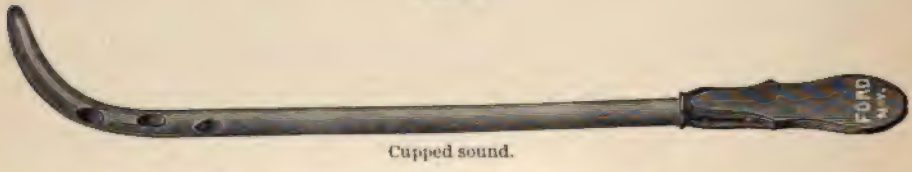
The duration of the urethritis has an important bearing upon its treatment. Let us first consider the cases in which the disease has lasted only a few months. Such patients may complain only of the morning drop, or they may state that they seem well so long as they use an injection, abstain from coitus, and do not drink beer and alcoholics or eat highly-seasoned food. When they cease injecting and indulge in creature comforts and excesses, the morning drop reappears, with perhaps a more or less profuse discharge during the whole day. Examination of the urethra in these cases shows a catarrhal and exudative condition from the bulb forward, perhaps nearly to the meatus. In many of these cases the posterior urethra is also involved. The morning urine is rather cloudy, like turbid cider, contains much mucus, and some long thin or thick threads (sometimes three or four inches long). There may or may not be a few gonococci present. In these cases the best treatment is irrigation of the anterior and posterior urethræ, using at first warm solutions of alum and sulphate of zinc, beginning with a strength of 1 : 500, and increasing according to the result obtained. Usually one irrigation daily is sufficient, but perhaps two may be well borne. The sensations of the patient and the condition of

stimulant effects of the silver salt with gradual dilatation and is sometimes very effective.

It is important that dilatation shall not be commenced too early in the course of chronic urethritis, since much harm may be produced. As a rule, a sound should not be introduced into the urethra until four months after the declining stage of gonorrhœa has begun.

Chronic Follicular Inflammation.—Inflammation of the urethral follicles, particularly when several inches down, is a condition which resists treatment and is difficult to handle. The parts must be exposed by means of the endoscope, and touched with a strong nitrate-of-silver solution on cotton at the end of a very fine silver probe, which, if

FIG. 24.



Cupped sound.

possible, should be gently pushed into the duct. Some authors recommend the destruction of the follicle by means of a very minute galvano-cautery needle. Great care and circumspection should be used when this rather heroic procedure is resorted to. After any of these applications it is well to inject the urethra with lead-water twice a day.

Follicular sinuses in the fossa navicularis and just within the lips of the meatus may, after thorough irrigation, be injected with a few drops of silver-nitrate solution (1 : 250) by means of the hypodermic syringe, the needle of which is made blunt by the removal of its point. In several cases of juxta- and intra-urethral sinuses I have produced a cure by applying on a delicate silver probe a coating of nitrate of silver obtained by melting the drug with heat. A few grains of the silver salt are placed in a small platinum crucible, which is exposed to an alcohol flame until liquefaction occurs; then the probe is dipped into the crucible and is thus charged.

CHRONIC POSTERIOR URETHRITIS.

In the treatment of chronic posterior urethritis with or without anterior urethritis great care is required to determine as nearly as possible the exact condition of affairs. In the more recent cases we sometimes find some evidence of bladder incompetence (the urine showing no involvement of that viscus), which shows itself by the escape of a little (ʒij to ℥ss or more) residual urine when the eye of the catheter reaches the neck of the bladder. In these rather early cases mild irrigations of the astringents and of permanganate of potassa may be used,

and perhaps with benefit. The most uniformly effective agent here also is the nitrate of silver, which may at first be used well diluted, 1 : 16,000 or 1 : 8000, in the form of hot irrigations. These may result in cure, but if the result is not perfect, injections of the same drug may be used in the stronger solutions.

Posterior urethritis combined with chronic prostatitis and seminal vesiculitis in which there are sexual disability, premature ejaculations, pollutions, absence of erections, and loss of sexual desire, usually requires the injection of a few drops of nitrate-of-silver solutions 1 : 250 or 1 : 125 every third, fourth, or fifth day. In these cases much benefit often follows a careful course of prostatic, and if possible, seminal-vesicle massage (see sections on Chronic Prostatitis and Seminal Vesiculitis) which should not be administered more frequently than once in five, seven, or ten drops. Irrigations of the rectum by means of Kemp's tubes with very hot water are sometimes of marked benefit.

Besides these local measures, patients thus afflicted need fresh air, relaxation, good sanitary conditions, and attention should be paid to their sexual hygiene. In some of these cases, where there is much hyperæsthesia of the posterior urethra, accompanied by erotic symptoms, much benefit may be produced by the introduction of steel sounds previously chilled with ice. This procedure should be cautiously carried out and its effects carefully watched. It should not be very frequently adopted, and at the most two séances a week should be given, and on these days the deep injection should be omitted. If good is going to follow, the patient will at once speak of his improvement. Should it produce a dull pain or an uneasy sensation, its use is contraindicated. It is always well not to use very large sounds; those having a calibre of No. 20 or 22 French are the best.

The Use of the Endoscope.—In the treatment of chronic urethritis the endoscope is useful under certain sharply-drawn restrictions. As a means of localizing an inflammatory focus, of viewing surface appearances, and of allowing the use of topical applications under free ocular inspection, it is often of signal benefit. It is an instrument of reserve rather than of routine, and it always should be used in a rational and conservative manner. It is to be regretted that it has been used very much as a toy, and has been to some simply a surgical hobby. There are those who have been so unkind as to say that some surgeons ostentatiously display and use it as a means of impressing patients with their skill and science.

As a general rule, it may be said that when in the treatment of chronic anterior urethritis the case resists the usual methods properly applied, then it is well to use the endoscope to determine the exact seat and nature of the lesion. It is well to sound a note of warning as to

the inspection of the posterior urethra. It is safe to say that many persons who cajole themselves with the idea that they have inspected this region have greatly deceived themselves. It is often very difficult to efface the subpubic curve with the endoscope tube, and often much damage is done in the attempt or in its accomplishment. A skilled expert only should make endoscopic examinations of the posterior urethra.

The precipitate use of the endoscope at the first examination of a case, before the other and less radical methods of examination have been tried, is to be very much condemned.

The efficient use of this instrument requires much time, study, and observation. The aim of the surgeon should always be to use such delicate care and circumspection that the operation is made as little troublesome and painful to the patient as possible.

It is always well to first examine and familiarize one's self with the appearances of the normal urethra, since by this course the study of abnormal conditions is rendered much easier and clearer.

The most useful endoscope is that invented by W. K. Otis.

The instrument consists of a metal tube or cylinder an inch and a quarter in length by somewhat less than half an inch in diameter, the first half inch of which is narrowed conically forming a funnel-shaped diaphragm having an opening a quarter of an inch in diameter, through which the rays of light emerge. At the other end of this tube is a second tube of the same diameter forming an elbow at right angles to the first tube three-quarters of an inch in length, into which the handle of the instrument fits.

The funnel portion unscrews from the upper tube, and a planoconvex lens at this point concentrates and directs the rays of a small electric lamp placed immediately behind it. This lens can be readily removed for cleaning.

The handle consists of a cylindrical piece of hard rubber about one-half inch in diameter and one and a half inches long, to the upper end of which is fixed the electric lamp, while the lower end is arranged to receive the cords leading the current from the battery. A small electric switch in the form of a milled wheel is placed on one side of this handle, a half turn of which makes or breaks the current. The two small screw-heads seen on the other side of this handle serve the upper to clamp fast the hood, the lower to fasten the lamp in position.

The lamp is of a variety known as "high efficiency," differing from others in a special preparation of the filament which enables it to give out a very intense light without a corresponding increase in heat; it is unusually strong and capable of withstanding a current of from sixteen to twenty volts. It is attached to a wire running through the centre of the handle, so

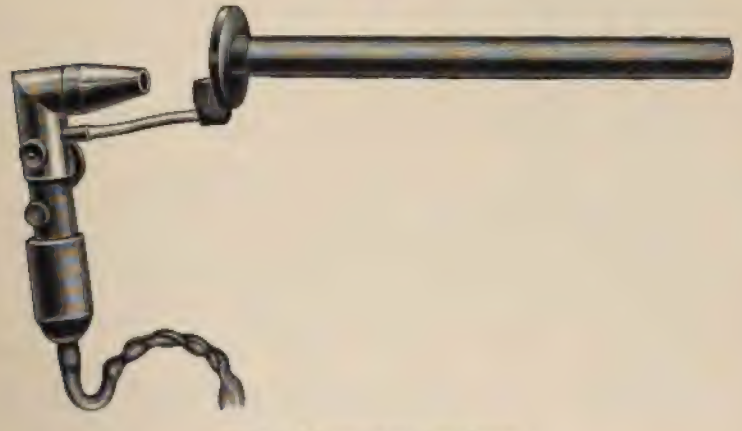
that it may be raised or lowered and clamped in position by the lower screw in the handle. The only adjustment which may be necessary is, when changing the lamp, to see that the filament of the new lamp should come exactly opposite the centre of the lens. A small piece of brass with a pinhole in it has been placed on the handle behind the lamp socket, so that by holding this to the light and moving the lamp up or down until the filament is exactly across the centre of the hole, the lamp may be clamped in the correct position.

A strong wire connects the instrument to the urethroscopic tube by means of a simple joint.

With reference to the length of the handle and the weight of the instrument, both of which have been criticized favorably and adversely, I would say that these depend entirely on the whim of the operator, as the handle may be lengthened to any extent or entirely obviated, while by slight alteration in material and construction the weight (less than one ounce) may be reduced to a few grains.

The accompanying illustration is from a photographic reproduction exactly half the size of the original. A straight line drawn along the

Fig. 25.



W. K. Otis "perfected" endoscope.

lower edge of the urethroscopic tube through the illuminating apparatus will give a very practical illustration of how little is the interference with a direct view of the field or the introduction of instruments. (See Fig. 25.)

Great pains have been taken and many experiments made to perfect this instrument with the result: *Of obtaining an illumination of field such as is not found in any other of any type. It gives the entire field of the tube used, offers no obstruction to the use of applicators, and at the*

same time nothing is inserted into the urethra which cannot be rendered thoroughly aseptic by boiling. It is simple in construction, strong, inexpensive, and fulfils all the indications of a good, practical, working instrument.

The instrument is attached to the Klotz urethroscopic tube by means of a stout wire an inch and a half in length, with hinged joints at each end, which swing in opposite directions and are furnished with set screws, thus allowing the instrument to be put in any position, though when once adjusted it will rarely be necessary to move it.

The patient having urinated is placed on his back with the buttocks resting on the edge of the operating-table, his feet being properly supported. The endoscopic tube is lubricated and passed slowly into the urethra as far as the bulb. The obturator is withdrawn and the light turned on. By gently withdrawing the tube the whole anterior urethra may be clearly examined. All morbid conditions are then noted.

The applications suitable for endoscopic treatment are, in the main, solutions of nitrate of silver, 5 : 10 to 100 of water. These should be applied by means of swab-holders or applicators carrying a tuft of absorbent cotton moistened in the medicated fluid. Strong solutions of sulphate of copper, 5 : 20 to 100, may be used, and in some cases such severe remedies as solution of perchloride of iron, liquor hydrargyri pernitratis, or Lugol's solution, may, of necessity, be resorted to. These latter solutions should always be applied sparingly and only on the morbid surfaces. Papillomatous urethritis may require operative measures if the little growths cannot be scooped off with the end of the endoscopic tube. They, with polypoid growths, may sometimes be removed by tampon écrasement, which means the introduction of a plug of cotton on the end of an applicator, which is pushed forward and backward and rotated from side to side until the growth is detached. After this a strong nitrate-of-silver application should be made. In some cases the urethral-polypus forceps may be employed.

The Question of the Infectiousness of Chronic Urethral Suppurations.

The question of the infectiousness of the secretion of chronic gonorrhea is one which frequently arises, and concerning which we have no precise data. In order to treat the subject intelligently we must study the peculiarities of each case and be guided by the results obtained. It will not suffice to state generalities merely, or to harp on the persistence of the presence of the gonococcus, or to endeavor to draw conclusions from statistics. We know by experience that in the third to the sixth month after the decline of a case of gonorrhœa in many patients a still infecting pus may be found in the urethra. In many other cases no

such pus can be found a month or two after the cure of gonorrhœa. It follows, therefore, that there is danger of contamination of women, in many cases, by men who were seemingly cured of gonorrhœa six months previously. Consequently, we must be on our guard when men having within half a year only recovered from gonorrhœa ask our opinion as to the propriety of marriage. In such cases the urine, particularly that of the early morning, should be carefully examined. If pus-cells are still present, together with epithelial cells, the patient should be subjected to further treatment, even though the gonococcus cannot be discovered in the microscopic field. In these chronic cases the examination should be pushed further and the condition of the prostate and seminal vesicles should be definitely ascertained. All morbid secretions from these parts should be carefully examined under the microscope.

My own experience convinces me that, in general, after the lapse of six months from the time of cure, provided there has been no recurrence, it is safe for a man to marry. It is a matter of common experience to see men who have only one or two months before recovered from gonorrhœa have intercourse with various healthy women with absolute safety to the latter. Though we can thus speak positively concerning these cases where men do as they please, we must be guarded when we are called upon for an opinion and do our utmost to protect the innocent. There can be no doubt that many women escape infection by men recently recovered from gonorrhœa by reason of the fact that the secretion is small in amount and is washed out of the urethra in urination.

I am so constantly seeing men who have chronic anterior and posterior urethritis, who have intercourse over long periods with women, wives and mistresses, without communicating gonorrhœa to them, that I am led to the belief that in very many of these cases the pus is inactive or effete. In such cases the microscope often shows a field covered with small withered pus-cells, and large, flabby epithelial cells studded with small fat-globules. When I see these features I am generally pretty certain that the secretion is not liable to cause infection. Exacerbations of such a low grade of morbid process may, however, produce a pus competent to infect.

I think it may be stated without fear of contradiction that if the vast number of cases of chronic suppuration of the urethra which are known to exist in men gave issue to infecting pus, gonorrhœa in women would be as common as it is in men. This certainly is not the case, for there are at the very least thirty cases of gonorrhœa in men to one case in women. This is under- rather than over-stated.

To sum up, we may say, on general principles, that danger lurks in all forms of urethral pus, particularly in that which is found within six

months after the supposed cure of gonorrhœa. In older cases it may be dangerous, but daily experience shows us that for some reason or other women may with impunity cohabit with men whose urethræ secrete pus sparingly. In many cases personal cleanliness and the salutary effects of urination may be the underlying causes of this immunity. In this connection it is well to repeat what has already been said. Too much stress is laid by some authors upon gonococci and other microbes in chronic urethritis. In very many cases the gonococcus has produced its pathological results and has disappeared, leaving an inflammation of the vessels and cell-infiltration behind it, which is then uninfluenced by microbes. This smouldering inflammatory patch gives forth pus which may not contain microbes; hence it produces no bad result. This phœnix-like character given by many to the gonococcus is in most cases a myth.

CHAPTER VII.

GONORRHŒA OF THE RECTUM AND MOUTH.

It is now a well-established fact that the rectum may be attacked by the gonorrhœal process. This affection is more or less frequently observed in countries in which sodomy is practised, and it sometimes occurs in America.

Symptoms.—The first symptom of gonorrhœa of the rectum is an uneasy sensation, attended with more or less heat. This may be complained of within from two to ten days after contamination. Heat and burning increase, defecation becomes painful and often more frequent, and soon a discharge is noticed which may at first be watery or milky, but which promptly becomes purulent and even streaked or mixed with blood. At this time burning heat and itching are felt in the anus, which becomes red and swollen, and a deep dull, aching pain in the rectum is felt. Defecation becomes more and more painful, and sometimes is so severe as to be agonizing. Frequent calls to stool keep the patient in a condition of apprehension and suffering. The purulent and bloody secretions often become offensive in smell, and ooze constantly from the inflamed and relaxed anal orifice. In well-marked cases decided constitutional reaction is observed at the end of a few days or a week. The patient looks haggard and worried, there is some rise in temperature, the pulse is rapid and small, and general malaise and debility are experienced.

The objective symptoms of gonorrhœa of the rectum and anus are striking. The mucous membrane becomes red and swollen, and in patches excoriated and ulcerated, with here and there red mammillations corresponding to inflamed follicles; a foul, tenacious pus bathes the rectal walls and escapes from the anal ring, which is thickened, reddened, excoriated, and perhaps the seat of several small- or good-sized fissures.

Etiology.—In most of the cases the infection occurs as the result of sodomy, more frequently in women and young boys, but also in older males, the active agent suffering at the time from gonorrhœa. In some cases the gonorrhœal pus is carried to the rectum by means of a soiled finger. It is claimed that in acute gonorrhœa in women the pus, escaping from the genitals, may infect the anus and rectum. This accident is, of course, possible, but as a broad general rule it may be stated that rectal gonorrhœa results from the intromission of an organ secreting or soiled with virulent pus.

Diagnosis.—It is frequently difficult to determine positively the gonorrhœal nature of a suppurating rectal inflammation. In some cases the history or concomitant circumstances point to a gonorrhœal origin. Very many patients will, from motives of shame, deny any unnatural practice and will endeavor in every way to mislead the physician. Others, again, will, with barefaced candor, promptly admit the shameful mode of origin of their trouble. In women suffering synchronously from purulent discharge from the vagina, urethra, or vulva the diagnosis is often easy. As a rule, the severity and persistency of a rectal or anal suppurating process will excite the suspicions of the physician. Then, again, the sudden onset and quick development of rectal gonorrhœa (the facts of which can generally be obtained without difficulty from the patient) will be an aid in determining the nature of the affection.

In many cases a diagnosis can be readily made by the microscopic examination of the pus, which must be taken on a sterilized platinum-wire loop from the surface most actively inflamed. To this end a speculum must be passed into the anus or rectum, as the case may be. Pus which has escaped from the anal orifice is liable to be mixed with other forms of cocci; therefore it should never be used. In the early stages of an acute process there will usually be little difficulty in finding specimens of pus in which there are gonococci.

Prognosis.—Though the course of this affection is often severe and sometimes alarming, its tendency in healthy and cleanly persons is toward recovery.

Treatment.—The patient should be confined to the house and placed in a recumbent position. Warm sitz-baths should be taken, and the rectum should be freely injected several times a day with a saturated boric solution, warm or cold according as it is agreeable to the patient. Enemata, hot or cold, of lead and opium are sometimes very soothing and efficacious. Lead-water or boric solution in combination are also of much benefit. It is necessary to free the bowel of fæces, and for this purpose castor oil or Epsom salts may be given. In the intervals of defecation suppositories of morphine or opium, sometimes with iodoform, may be used if necessary. When the intensity of the symptoms has passed, slightly stimulating enemata of sulphate of zinc and laudanum may be used. Solutions of bichloride of mercury have not proved of value as injections. Toward the cessation of the suppurating process solutions of nitrate of silver (1 : 8000 or 1 : 4000) may be very useful. To these solutions wine of opium or fluid extract of belladonna may be added.

Gonorrhœa limited to the region of the anal orifice requires constant attention to cleanliness and sitz-baths, and the application (when acute) of lead-and-opium wash, and, later, of bland dusting powders.

GONORRHŒA OF THE MOUTH.

Our knowledge of gonorrhœal infection of the mouth is very incomplete, and further observation and careful clinical and bacteriological studies are necessary before a satisfactory account can be given of it. A study of the cases thus far reported warrants the assumption that there is a specific inflammation of the mouth contracted by beastly and unnatural practices, and perhaps caused by the gonococcus. From the following cases an idea of the clinical history of this affection may be obtained :

Hölder relates the case of a young man who had buccal coitus with a man suffering from urethral gonorrhœa. The day after he had pain in the lips and gums. On the fourth day the mucous membrane of the lips and buccal cavity became intensely red, the gums were spongy and inclined to bleed, with a tendency to recede from the teeth, and the buccal secretion was increased in quantity. Motion of the mouth was painful. Hölder states that the affection begins with a sensation of heat and dryness in the mouth, which at first appears very red. Soon a purulent secretion flows from the swollen and inflamed parts, which may be covered with an aphthous-like exudation. The affection in this case was cured by an alum gargle in eight days.

Cutler also reports a case which is fully as striking as the foregoing. It was that of a woman who had coitus *ab ore* with a sailor who was found to be suffering from gonorrhœa ; the next morning her mouth was raw and sore and the saliva had a horrible taste. On the second day little sores appeared on the lips, and on the third day the gums and tongue became swollen and painful. By the fifth day the whole buccal cavity was so inflamed that she could not eat, and a whitish fluid, mixed with blood, having an unpleasant odor and taste, was secreted. Examination showed the mucous membrane of the lips and cheeks was thickened, reddened, denuded of epithelium in spots, and covered in areas with a false membrane, which was readily detached, leaving an excoriated surface. The gums were swollen, retracted from the teeth, and bled readily on pressure. The tongue was swollen and very tender, and could only be slightly protruded, and then only with much effort and pain. The surface was red and glazed and covered with small ulcers which secreted a thick yellow pus. The soft palate and pillars of the fauces were much inflamed, but the parts beyond were in a normal condition. The breath was very offensive. There was little salivation.

The mouth-secretion consisted of mucus, pus-cells, and epithelium, and contained a large quantity of bacteria. In the false membrane a micro-organism resembling the gonococcus was seen, but its identity was not fully established. Soothing applications brought about an amelioration of the symptoms.

CHAPTER VIII.

COMPLICATIONS OF GONORRHŒA.

CONGESTION OF THE PROSTATE.

ACUTE congestion of the prostate may occur in the course of acute posterior urethritis either in its declining or terminal stage.

Symptoms.—With this further extension of the gonorrhœal process the patient has still other symptoms, besides those of acute posterior urethritis. He complains of a sensation of dull weight and pressure in the perineum deep in the pelvis, and an uneasy sense of fulness in the rectum or anus. In severe cases rectal tenesmus may add to the patient's discomfort. The vesical tenesmus may be increased, and often in defecation the patient experiences severe pain in the prostate when the fecal mass passes under it. When there is much swelling, the stools are small and ribbon-shaped. Rectal examination reveals a swollen organ, firm or boggy, hot and very painful, broader than normal from side to side, and bulging considerably into the rectum.

Painful erections and bloody pollutions are sometimes very distressing symptoms.

In some cases the patient experiences difficulty in urination, and complains of a sensation as if his urethra was too small to allow the stream to pass through it even with great straining. Under these circumstances, the stream is small and weak, even hesitating and intermittent. In some cases, such is the swollen condition of the organ and of its urethral mucous lining that the patient cannot void his urine, and has to be relieved by the introduction of the catheter. In bad cases there may be vesical and rectal tenesmus superadded, and in some cases there is spasm of the compressor urethræ muscle. Under these circumstances the patient often fails to thoroughly empty his bladder, and then the accumulation of urine causes continuous vesical tenesmus. The bowels are frequently constipated, and when the vesical tenesmus comes on the patient makes painful and often vain efforts to free them.

Examination of the urine gives the same results as are seen in acute posterior urethritis.

In the great majority of cases this congestion is temporary. It may last a few days or two or three weeks; usually, however, resolution takes place in about ten days. With the decline of the posterior urethritis the swelling and tenderness usually subside. In some cases the

involution of this congested condition of the process occurs suddenly and unexpectedly a few days after its onset.

In exceptionally bad cases the inflammation becomes so severe that an abscess is developed.

Subacute and Chronic Congestion.—A subacute congestion of the prostate may be due to violence from sounds, catheters, lithotrity instruments, to the irritation of a stone in the bladder and of a fragment of stone, or of small stones impacted in its mucous membrane, and to stricture. Recently many cases of subacute prostatitis have been observed as a result of the intemperate methods of treatment now so much in vogue which are intended to abort or quickly cure gonorrhœa.

In chronic posterior urethritis subacute congestion of the prostate may be caused by sexual and alcoholic excesses, by masturbation, and by violent exercise, particularly in horseback riding and bicycling.

In some rather rare cases rectal examination shows that certain parts of the prostate are more swollen and harder than the rest. In this condition it may be that certain groups of follicles are the seats of greater œdematous hyperplasia than the balance of the tissue.

Treatment.—When, during gonorrhœa, symptoms of congestion of the prostate are observed, the patient should at once be put to bed and treated on antiphlogistic principles. The bowels should be kept free and the diet should be of gruel or bread and milk. In the case of strong individuals six or more leeches may be applied just in front of the anus, and the patient be then put in a hot sitz-bath. No general rule can be laid down as to the use of heat or cold. In some cases heat gives marked relief, and in others cold acts equally as beneficially. Hot flaxseed poultices or the hot-water bag, with the intervention of some lint well moistened with water, may be applied to the perineum. In these cases very warm enemata, given by means of Kemp's rectal irrigator, act well on the prostate and free the rectum of feces. In case cold is more grateful, an India-rubber bag filled with ice-water or broken ice may be applied to the perineum, on which a folded towel must be placed so that the intensity of the cold may be moderated to suit the patient's feelings, or irrigations with cold water may be cautiously used.

All urethral injections being suspended, the patient may take the potassa and hyoscyamus mixture (see page 60), and drink freely of diluent waters of various kinds, according to the preference of the surgeon. Morphine or opium should be given generously, if necessary, by the mouth or in the form of suppository in order to relieve pain.

When the patient is up and around again he may be much benefited by lavages of a very mild solution of nitrate of silver, 1 : 8000 or 1 : 4000, which should be given every second day, and every day if well borne and beneficial.

If during the course of congestion of the prostate complete retention of urine occurs, it should be relieved by careful catheterization. For this purpose an aseptic silk or lisle-thread catheter (which is both flexible and at the same time firm and very smooth), of a calibre of not more than 12 or 13 French scale, should be introduced into the bladder.

For the treatment of subacute and chronic congestion of the prostate, the measures recommended for the treatment of chronic posterior urethritis (see page 83, *et seq.*) should be adopted in combination with careful massage of the organ.

Abscess of the Prostate.

In some rare cases of acute gonorrhœal congestion of the prostate the inflammatory process becomes so severe that an abscess is formed.

Symptoms.—The formation of pus in the prostate is usually attended by quite well-marked symptoms, such as chills, fever, general depression, a sensation of throbbing in that body, and a feeling as if there was a lump in the rectum. There may also be pain along the urethra in the perineum, rectum, and lumbar region. The further symptoms are painful micturition and defecation. In some cases the urethral canal is entirely occluded by the swelling, and the patient is unable to pass any of his urine. He of necessity lies on his back and flexes his thighs, thereby avoiding all pressure on the perineum.

As a rule, however, when the abscess is fully formed, the constitutional symptoms are much more pronounced than at first. The rigors are more severe and are attended with flashes of heat; there are great thirst, restlessness, and jactitation, very high fever, and sometimes delirium. The pain becomes more violent and the throbbing more distressing, and the sensation of fulness and weight at the neck of the bladder and in the rectum and anus causes agony. These symptoms, together with the frequent scalding urination, made drop by drop or in a thin, feeble stream, stamp abscess of the prostate as one of the most acutely painful and distressing maladies known to man.

With the bursting of the abscess, naturally or by operation, everything is changed. The patient is immediately relieved of his suffering, he can urinate freely, and his febrile symptoms soon disappear. If the inflamed tissues contract and efface the abscess-cavity, as they commonly do, all is well and the patient is spared further trouble.

It must be remembered, however, that there are many cases of prostatic abscess in which the symptoms are not by any means as severe as just described, and in which the patient is not confined to his bed.

Course.—Abscess of the prostate always begins in one or more follicles, which become acutely inflamed. From this focus the morbid process increases and forms abscesses of various sizes. As a rule, the

lateral lobes are more frequently the seat of abscess than the third portion. There may be one or two abscesses, and in exceptional cases there may be as many as from six to twenty. In this event as many different follicles have become the seat of abscess as there are abscesses, which are usually of the size of a pea and even smaller. When the abscess is limited to one lobe and points toward the urethral canal, it may partly or wholly block it up. The introduction of a catheter then to relieve retention will be accomplished with more or less difficulty, and its point will deviate in the opposite direction from the lobe involved. Rectal examination will reveal general enlargement of the organ, and it may happen that the surgeon will be able to ascertain that the process is unilateral.

The size of these abscesses varies considerably. They may contain a teaspoonful, an ounce, and even as much as eight ounces, of pus. The contents of these abscesses may be pure pus free from odor, or it may be serosanguinolent; it may be mixed with the débris of the gland or it may be of a very unhealthy character and very fetid.

Abscesses superficially seated in the prostate and pointed toward the urethra cannot, as a rule, be clearly defined by rectal examination, but their presence may be detected by the passage of a catheter of medium stiffness. When the abscess is deeply seated in the prostate, it can generally be well made out by the finger in the rectum.

Abscess of the prostate may also form in an insidious manner, without provoking any general or local symptoms pointing to its existence.

In rather more than one-half of the cases the abscess bursts into the urethra, and it is safe to say that at least a large majority of the patients experience no ulterior trouble.

Unfortunately, however, prostatic abscesses may open into the bladder, the rectum, the vesicorectal space, the perineum, and the peritoneal cavity.

When the abscess is developed in the posterior portion of the gland the tendency is for it to burst into the rectum, which is a serious condition. It then leaves a fistulous tract which it is very difficult to heal, and which allows the escape of urine into the rectum. The pus, however, may burrow downward and point as a red indurated area in the perineum anterior to the anal orifice. It may pass through the ischiorectal fossa and appear in the perineum. It may extend toward the scrotum and sheath of the penis, and may pass down to the thigh or upward to the region of the false ribs.

The other modes of burrowing are quite rare, and each of them presents its individual indications for surgical relief.

In the course of these aberrant burrowings many complications may occur, and there is always danger of pyæmia.

The bursting of the abscess [illegible] neum always causes great

pelvic pain and very severe, even alarming, constitutional symptoms. Death usually ensues in a day or two.

In the progress of the burrowing process the patient may experience more or less pain in the parts, which become red, swollen, and hard.

Congestion and abscess of the prostate are generally found in young men.

Prognosis.—Abscess of the prostate is almost always a painful affection, and sometimes a dangerous and even deadly one. In quite rare cases the abscess when not recognized and untreated causes pyæmia and death. The rectal fistulæ are very hard to cure, and they cause much discomfort and suffering to the patient.

When the patient is young, otherwise healthy, and of firm fibre and of good habits, his chances of recovery, even when afflicted with bad fistulæ, are usually good. In elderly and sickly individuals the prognosis is usually grave.

With the institution of prompt aseptic surgical intervention in cases of abscess of the prostate the prognosis becomes very much more favorable.

Treatment.—The treatment of abscess of the prostate should be based on general surgical principles. The first essential is to determine, if possible, in which direction the abscess points. If the inflammatory swelling is superficial and pushes into the urethra, the surgeon will very often have timely warning by reason of the difficulty, and even impossibility, of urination which the patient experiences. In such cases the catheter must of necessity be used, and fortunately it very often causes the abscess to open and discharge into the urethra in which event prompt resolution occurs. When the abscess is deeply seated, active and early surgical intervention must be employed in the following manner: the patient, being prepared and etherized, is placed in the lithotomy position, with the thighs widely separated, then the abscess-cavity is opened by means of a long incision in the perineum just in front of the anus. In making the dissection the surgeon is much aided by having the left index finger-tip in the rectum at the apex of the prostate and by the presence of a sound or bougie in the urethra. The wound is then irrigated, packed, and dressed in the usual manner.

Gonorrhœal inflammation of the prostate may be one of the predisposing causes of chronic prostatitis, all forms of which are described on page 288, *et seq.*

URETHRO-CYSTITIS.

Until within the past few years posterior urethritis, acute and chronic, was described as cystitis, which was said to be a frequent complication

of gonorrhœa. To-day we have very clear ideas as to the nature and course of posterior urethritis, acute and chronic (see sections on these subjects), and we know positively that in very many cases of these troubles there is no involvement of the bladder whatever, the inflammation being quite sharply limited to the membranous and prostatic urethra.

The inflammatory process, however, may invade the bladder in part or in totality. In the majority of cases only that portion of the bladder near the internal urethral orifice, particularly on its sides and also at the base or trigone, is attacked. This limited bladder-inflammation, together with posterior urethritis, constitutes what is known as "urethro-cystitis."

This morbid process, however, may extend, and in time involve the whole bladder, in which event there is a true cystitis resulting from gonorrhœal inflammation.

Acute Urethro-cystitis.

Urethro-cystitis may be acute, subacute, or chronic. When the inflammation is still acute, and that portion of the bladder near its neck becomes swollen and red and secretes pus, the symptoms are those of acute posterior urethritis intensified. These are mostly tenesmus, pain at the end of micturition, and perhaps hæmaturia. Examination of the urine shows opacity in the two cylinders, but instead of the second specimen being less cloudy than the first, as is the case in posterior urethritis, it is as cloudy, and even may be more cloudy, than the first. In some cases, but not in all, if the patient urinates into three glasses, the urine in the first, which clears out the posterior urethra, will be very cloudy, the second specimen less so, while the contents of the third glass, which come directly from the inflamed viscus in a state of tonic contraction, will be very cloudy, owing to the forcible extrusion of pus from the texture of the mucous membrane. If hemorrhage is small, only the third portion will contain blood, but if it is copious, all three specimens will contain it.

The urine is usually of acid reaction, and presents a greenish opaque appearance. Whenever the tenesmus is great, albumin may be present. Alkalinity of the urine may be caused by pronounced hæmaturia. When allowed to stand, as a rule the tissue-products do not settle promptly; hence fully twenty-four hours may elapse before the pus, epithelium, and mucus have settled to the bottom of the cylinder. Then we see a grayish granular and quite thick layer, in which are pus-cells and bladder-epithelium; if hæmaturia exists, there is a red layer of blood over this, and floating, cloud-like, over all is the readily movable layer of mucus.

Subacute and Chronic Urethro-cystitis.

Besides the prompt and acute invasion of the lower part of the bladder from the posterior urethra which has just been considered, there is a subacute and chronic form which is equally as common.

Subacute urethro-cystitis may develop as a result of an exacerbation of chronic posterior urethritis. When this occurs, it is usually as a result of sexual and alcoholic excesses, great physical strain, particularly in horseback riding, wrestling, and bicycling. Exposure to cold in the various ways incident to daily life is also productive of this extension. In some cases long delay in urination, and in others the introduction of catheters or sounds, have caused the phlegmasia to spread from its urethral seat to the bladder-walls.

In cases of subacute and chronic urethro-cystitis the symptoms are similar, but less pronounced than in the acute form. As the chronicity of the case increases, the tenesmus and other symptoms may grow much less and in some chronic cases cease to exist. In some cases of first attack, as well as in relapses later in the declining stage, patients complain of a dull and uneasy sensation long after urination, and they speak of a feeling as if the bladder yet contained urine. The catheter being passed, half an ounce to an ounce, or even more, of urine flows out. In these cases, owing to the swelling in the mucous membrane and its subjacent connective tissue, the bladder is unable to expel all of its contents. This uneasy sensation is in marked contrast with the sharp, sometimes radiating, pains felt at the end of urination. As a result of the chronic inflammation, in some rare cases a villous condition of the mucous membrane around and near the bladder-neck, as shown by a quite thickened and velvety appearance, is produced, which gives rise to hæmaturia, particularly at the end of urination. In some of these cases the existence of a bladder-tumor might very properly be suspected.

Microscopical examination of the urine of urethro-cystitis shows a conglomeration of tissue-products. The various forms of epithelial cells derived from the posterior urethra will be found inextricably mixed with the large flat bladder-epithelium. These, with pus-cells, mucous corpuscles (perhaps a few gonococci), many and varied cocci and bacteria, and blood-corpuscles, cover the whole field.

Treatment.—In acute urethro-cystitis the patient should at once assume the recumbent position. A plain, bland diet of bread and milk, and rice and Indian meal with milk, should be ordered. The bowels should at once be acted upon and kept mildly relaxed. Pain may be relieved by suppositories, or by opium by the mouth or morphine by hypodermic injection. If there is much suprapubic pain, an ice-bag may be carefully applied and kept on if it affords comfort. In some

cases a hot-water bag or hot flaxseed poultice will be indicated. Hot sitz-baths and full hot baths may be beneficial.

In the very acute stage all treatment by injections should be stopped.

Infusions of buchu and of uva-ursi sometimes seem beneficial. The fluid extracts of triticum repens and of kava-kava also may be used, either alone or in combination. Thirty drops of each in plenty of water, with two or three drops of laudanum when the pain is severe, may be given every three or four hours. When opium in any form is administered, the condition of the bowels must be carefully looked after and constipation avoided, either by the use of enemata or of aperients or cathartics.

In some cases alkalies produce a soothing effect. Bicarbonate of potassa and citrate of potassa in thirty-grain doses, dissolved in water or carbonic water, may be given three times a day. With the decline of the acute and the onset of the subacute or chronic stage the use of antiblennorrhagics—cubebs, copaiba, and oil of santal—may be of signal service in some cases, whereas in others they may cause actual discomfort. Their effect, then, should be carefully watched, and if they give decided relief, they may be continued; if not, discarded. Irrigations into the bladder of warm boric or salt solutions combined with laudanum may give comfort to the patient.

In the subacute and chronic stages the most reliance is to be placed on the action of solutions of nitrate of silver, used at first very weak and increased as the treatment is continued. In many cases much benefit follows the injection into the posterior urethra of a hand-syringeful of a warm solution of nitrate of silver (1 : 16,000, and as strong as 1 : 4000). This agent irrigates the posterior urethra and passes into the bladder, upon the lower part of which it acts beneficially. It may be retained for a few minutes, and then voided, and as it passes out it again affects the morbid surfaces. Such an irrigation may be made daily, but the sensations of the patient must be the guide in deciding its frequency. As the case progresses the strength of the solution should be cautiously increased, until toward the last instillations of stronger solutions of nitrate of silver (see Treatment of Posterior Urethritis) are resorted to.

Solutions of permanganate of potassium, 1 : 3000 or 1 : 6000, also produce good results in some cases.

CYSTITIS.

This affection may be acute or chronic.

Acute gonorrhœal cystitis—meaning inflammation of the whole of the mucous membrane of the bladder—is a very rare complication of gonorrhœa, since acute posterior urethritis, even when it invades the

bladder, usually only involves an inch or two, or perhaps more, of tissue near the internal sphincter. Very exceptionally the inflammation extends and involves the totality of the mucous membrane. In these cases the symptoms are still those of acute posterior urethritis, besides which there may be pain over the symphysis pubis, malaise, and fever. The urine is very opaque and contains bladder-epithelium, pus, and bacteria.

When the urine is tested in these cases the second and third specimens are even cloudier than the first. In the earlier stages the urine is acid and has no foul smell; later it may be alkaline and offensive.

This form of cystitis may end in one or two months, but there is a marked tendency in these cases for the process to become subacute and chronic.

Chronic gonorrhœal cystitis is a very persistent affection, and often resists the most intelligent treatment directed against it. Usually, with the involvement of the whole bladder the symptoms of posterior urethritis cease, except perhaps that a slightly increased frequency of urination remains. In the older cases we frequently hear patients complain of a burning or scalding pain on urination, with uneasiness sometimes amounting to a paroxysm of pain at the end of the act. Urination may be very frequent both during the day and the night. With the continuance of the cystitis the morbid process, which at first was superficial, involves the deeper part of the mucous membrane, and forms what is called "parenchymatous cystitis." Progressing farther, ulceration of the bladder may result or the morbid process may extend up the ureters, involving them and then attacking the kidneys and the pelves. In cases of chronic parenchymatous cystitis the urine is usually alkaline, and has a very foul, even feculent, odor.

Diagnosis.—The diagnosis of gonorrhœal cystitis is to be made by a study of the history of the case and of its symptoms, together with examination of the urine. The urine varies according to the severity and chronicity of the cystitis. It may be simply purulent urine of acid reaction, or alkaline and fetid. The three-glass test will show cloudiness in each specimen, more particularly in the last. In this connection it is important to remember that urine alkaline from phosphates, carbonates, and urates very commonly has the cloudy look of purulent urine, but its nature is soon revealed by a simple method. If the cloudiness is due to urates or uric acid, it vanishes by the use of heat. If it is due to phosphates, carbonates, or pus, heat increases the turbidity, but a few drops of acetic acid will clear up phosphaturia and carbonuria (the latter with much effervescence), while, if the opacity then remains, it is caused by pus or bacteria.

In all cases the microscope should be constantly used in the exami-

nation of the urine, and the following features will generally be found reliable guides in diagnosis: If the cystitis is still rather young and the urine is still acid, on its examination various forms of urethral epithelium, bladder-epithelium, and pus will be discovered. This combination, the history being in accord, will usually warrant a diagnosis of cystitis. When the process is old and the urine alkaline, withered-up pus-cells, bladder-epithelium, and triple phosphate will dominate the field and establish the diagnosis. The absence of casts and renal epithelium will show that the morbid process is still confined to the bladder.

Chronic cystitis from gonorrhœa is usually found in young and middle-aged patients; cystitis from stricture and hypertrophy of the prostate is usually found in more advanced subjects.

Pathology.—The pathology of gonorrhœal cystitis is not yet clearly demonstrated. In acute cases of posterior urethritis the pus quite commonly contains the gonococcus; but as the process grows old this microbe disappears and other forms of cocci seem to take its place. This same condition is observed in the pus of urethro-cystitis and of cystitis, in the secretions of which it is impossible to find the gonococcus, except rarely in very small numbers, but myriads of cocci and bacteria may be plainly seen. Much study is necessary to clear up this interesting subject. The theory of a mixed infection being the cause of this trouble suggests itself, but it cannot, as yet, be strongly urged.

Treatment.—The diagnosis being made, and the absence of stricture being determined, general and local treatment should be instituted. The diet must be regulated and be confined to bland, easily-digestible articles. Coffee, spices, beer, alcoholics, are to be interdicted. As much bodily quiet and ease as possible should be observed. In these cases care must be exercised in the use of alkalies, which some physicians seem by instinct to prescribe indiscriminately. The tendency is toward alkalinity of the urine; therefore we should be on our guard.

When the urine is alkaline, urotropin, dilute nitric acid, dilute nitro-muriatic acid, and dilute muriatic acid may produce decided benefit. Salol, salicylate of sodium, benzoic acid, and salicine may be of benefit in tending to restore an aseptic condition of the bladder, which is the chief aim of treatment.

Warm irrigations of saturated boric solution, to which a little laudanum may be added, may be of benefit for a time. Then the indications are for the use of more decidedly active irrigations, such as nitrate of silver, permanganate of potassium, and in some cases of alum and sulphate of zinc in combination. The strength of these solutions should be adapted to the case, and their action should be carefully watched. In some cases benefit follows irrigation with solutions of bichloride of mercury. It is well to begin with the strength of

1 : 30,000, and increase if progress is made, or desist if a feeling of discomfort is produced.

These cases are frequently very trying to the patient and to the surgeon, whose therapeutic armamentarium they often sorely tax.

As a last resort, perineal section should be performed and the bladder irrigated and drained.

INFLAMMATION OF THE SEMINAL VESICLES.

Seminal vesiculitis, or spermato-cystitis, may be acute or chronic, and is almost always secondary to gonorrhœa or to hyperæmia of the posterior urethra due to masturbation and venereal excesses, or to inflammation of this region resulting from traumatism, catheterization, endoscopy, and strong injections.

The **symptoms** of the acute form of seminal vesiculitis are quite similar to those of posterior urethritis and to those given as diagnostic of the several varieties of prostatitis. The patient first experiences pain, either of a dull or throbbing character, or a sensation of weight, which he refers to the deep portion of the pelvis just within the anus or at the neck of the bladder or in the perineum. There is a markedly increased frequency in urination, and tenesmus sometimes mild, again quite decided, and in some cases very severe. As the bladder fills the painful symptoms increase in severity, and there may be pain at the end and sometimes at the root of the penis. There may be fever, chills, and malaise. All these symptoms may be present in posterior urethritis, so that the crucial test in diagnosis is palpation of the prostate and seminal vesicles by means of the finger in the rectum. If seminal vesiculitis is present and explored for early, one or both vesicles will be found to be much enlarged in all directions in the shape of a distended leech, hot, brawny, and exquisitely tender. In a few days the swelling may still further increase, and then moderate fluctuation may be felt. In some of these cases the patient presents a pitiable spectacle. He suffers from pain in the perineum, rectum, bladder, and at the top of the sacrum. He has frequent desire to urinate, and the act is attended with much pain, or, again, in some cases, there is very distressing dysuria. Defecation is very painful, and perhaps complicated with rectal tenesmus, and may be attended with vesical spasms; sleep is heavy and unrefreshing, and often during the night painful erections and pollutions, perhaps bloody, may add to the patient's sufferings. The urine may contain pus and epithelial cells, but these tissue-elements may be absent for hours or for days, during which the urine is clear; and in this feature acute seminal vesiculitis differs from acute posterior urethritis, in which the discharge of pus or blood is constantly seen. At the onset, and early in the course, of seminal vesiculitis the gonor-

rhœal discharge may disappear entirely, and in this it resembles epididymitis. But in a short time the discharge reappears, and it may be more or less bloody. In seminal vesiculitis the blood is mixed with pus or the latter is streaked with it; whereas in posterior urethritis the blood follows the act of urination or there may be a worm-like thread of coagulated blood with the first jet of the urine.

The inflammatory stage of seminal vesiculitis is usually quite acute, and at the end of a week or ten days the symptoms become ameliorated and resolution gradually sets in. In all probability, in many cases the parts sooner or later become normal. In some cases after resolution of the vesicular inflammation the urethral discharge reappears, while in others the urethra is left in a healthy condition. In this acute stage of inflammation the morbid process resembles that of gonorrhœa in the redness and swelling of the mucous membrane and in the submucous cell-increase. When, however, the inflammation becomes intense, a true suppurative process or abscess forms, in which event the local and general symptoms are more pronounced and the sufferings of the patient greater. Rectal exploration then reveals a large boggy, painful swelling at the base of the bladder, beyond and to the outer edge of the prostate.

While the ejaculatory duct of the seminal vesicle remains patulous the contained pus may escape, or perhaps may be massaged by means of the finger-tip, into the urethra, in which event complete resolution without ulterior bad results may occur. If, however, the duct becomes occluded by the swelling of its mucous membrane or by being plugged up by sympexia or masses of mucus dislodged from the diverticula of the vesicle, the abscess may attain a very large size, and the pus may perforate its wall and burst into the ischio-rectal fossa or around the rectum into the bladder, the rectum, and the peritoneum, sometimes causing death from septicæmia, and generally leading to the formation of fistulous tracts. The intimate relations of the vas deferens, the ejaculatory duct, and the seminal vesicles are such that the last structures and the testicles may be involved at the same time. It is probable that in many cases seminal vesiculitis and epididymitis coexist, but that the violence of the symptoms of the testicular trouble masks that of the vesicular affection. It is also very probable that the intrapelvic pain which so frequently accompanies acute epididymitis, and which we have been taught is due to a complicating phlegmasia of the pelvic part of the vas deferens, is sometimes really symptomatic of involvement of the seminal vesicle. There is a field for observation in this direction, and much may be learned from digital exploration of the rectum in cases of acute testicular inflammation.

It can be readily understood, after a consideration of the foregoing

facts, why acute seminal vesiculitis has been wrongly diagnosticated as posterior urethritis, as acute prostatitis, and as inflammation of the vesical neck and floor of the bladder.

Chronic Seminal Vesiculitis.

This form of seminal vesiculitis may result from the non-occurrence of resolution in the acute affection, and in this event the clinical history is tolerably clear and striking; but in the majority of cases of chronic seminal vesiculitis it begins as a low-grade inflammatory process in persons, particularly of neurotic or neurasthenic types, who may suffer from chronic subacute posterior urethritis or chronic prostatitis, and in confirmed masturbators and in those given to excessive venery and alcoholics. The difficulty in the study of the chronic form of seminal vesiculitis is that in many cases the symptoms are so few and so vague, and point so indefinitely, if at all, to trouble in these vesicles, that oftentimes their origin is not suspected by the physician. Then, again, cases are seen in which the symptoms are very clearly and strongly marked, yet they may be with seemingly good reason attributed to trouble in the posterior urethra and in the prostate.

Cases of chronic seminal vesiculitis which follow quite directly a recent or more or less remote attack of gonorrhœa, very often present such a group of symptoms that the surgeon is led to suspect their origin in inflammation of the seminal vesicles, particularly if no trouble is found in the posterior urethra. Such patients state that since an attack of gonorrhœa or a relapse they have not felt well as regards their sexual organs. Some complain that they are sexually weak, that they have little desire, or that they have premature and perhaps painful ejaculations, which in some cases are mixed with blood. Others, again, are subject to a constant slight or profuse discharge which is of a mucous or muco-purulent character. Again, this form of discharge may be intermittent. There may be, however, a decided chronic seminal vesiculitis without any perceptible discharge. Not infrequently patients having a history of one or more attacks of gonorrhœa state that they suffer from a mild or moderately severe, even burning, pain or itching, or a sense of weight in the course of the urethra, in the perineum, bladder, anus, and rectum. In addition to this they often give a history of sexual erethism with or without gratification in coitus, and sometimes of increased desire, while little relief, or even aggravation of symptoms, may follow the sexual act.

In pronounced masturbators and in those given to excessive sexual indulgence, particularly with the addition of alcoholic excesses, chronic seminal vesiculitis may sometimes be found. These cases are often anæmic, neurotic, and neurasthenic subjects who respond very indiffer-

ently to treatment. Such patients may complain of some pain or disturbance in the urethra, bladder, anus, or rectum, and they may present a discharge; then, again, all these symptoms may be wanting. Most of them, however, give a history of disturbances in the sexual function. The disturbances are mainly of two forms; first those of lowered power, and, second, those of erethism of the sexual organs. In the first order of cases we find absence or incompleteness of erections and pollutions from slight causes, without enlargement of the penis. In these cases there is often a haunting desire for erection, with no response. Very often these patients suffer from a constant dribbling of a dirty gray or brownish mucus, which may during the day be so copious as to saturate one or two pocket handkerchiefs. Then, again, some of these patients have no such discharge, but an emission of a thin, gray, watery, and sometimes brownish and even curdy fluid occurs daily or more frequently. Such is the erotic condition of these patients that the sight of a pretty woman, of her breast or her ankle, throws them into a high state of nervousness and sexual erethism. Accidental slight contact, the glance of the eye, the sound of the voice, and the grasp of the hand serve so to excite these men sexually that an orgasm, with partial erection, results.

These cases run a somewhat peculiar course. In some the symptoms and conditions continue in a more or less subdued manner, and, though they disturb the patients considerably, the latter arrive at a state of mind by which they bear their troubles more or less philosophically. In this class of cases the affection runs on from year to year in a monotonous way. Such patients are neither healthy nor very sick. But cases are sometimes seen in which the chronic, uneventful course of the affection is varied by the development of more or less severe exacerbations. In this event the health becomes deteriorated, the patients lose their appetite and weight, and present the appearance of very weak and sick men. Concomitantly with this condition the nervous system becomes much disturbed and the patients present the symptoms of neurasthenia. A nervous apprehension and anxiety are very frequent concomitants. Such an exacerbation may last one month or many months, and may lead to permanent invalidism.

Diagnosis.—The diagnosis of seminal vesiculitis, in whatever form it may exist, is to be arrived at mainly through palpation of the parts by the finger inserted into the rectum. It has already been shown how little light the subjective symptoms throw upon the nature of the trouble. It is always well that the bladder should be slightly distended, for in that condition the vesicles are more readily detected. Then the finger (which should be a long one) is introduced into the rectum, and, having defined the outline of the prostate, the vesicles are

sought for above and to the outside of this body. The examination may be made with the patient lying on his back or standing up with the body bent at right angles to the legs, which are slightly separated. Abdominal pressure, exerted deep down and toward the pelvis, may often afford much aid in these examinations.

At the prostate the two vesicles approach to within a finger's breadth of one another, and on the inner side of each is the vas deferens, which at this part frequently becomes much ampullated. The seminal vesicles in health have a firm, somewhat resistant structure, which, while not presenting a brawny feel to the touch, gives the sensation of having tolerably thick walls. Therefore the surgeon must not enter upon the examination with the idea that he is to feel two oblong, rather soft, and readily-compressible little bladders.

If diseased, the seminal vesicles will, in the acute stage, feel much swollen in all directions, tender, perhaps hot, and may present a doughy sensation, like that of the over-filled leech. In the stage of abscess the swelling will be great, the pain intense, and the symptoms severe and pointing to intrapelvic trouble.

In the chronic forms a large flabby tumor may be felt. If both vesicles are involved, the base of the bladder beyond the prostate is the seat of the tumor, which is usually of goodly size, often very large. In chronic cases the surgeon must always remember that the posterior urethra may be the seat of a low grade of inflammation, and that the prostate may also be at least hyperæmic. This same caution applies very strongly to the cases of old men who are suffering from enlargement of the prostate and also from a chronic inflammatory condition of the seminal vesicles—a complication which is sometimes met with.

Examination and manipulation of the seminal vesicles by means of the finger-tip may cause a flow of pus, with perhaps blood, into the urethra when the inflammation is recent and active. In the subacute cases the discharge is muco-purulent and mucoid, containing masses of inspissated semen, and of mucus, sympexia, and sometimes very minute calcareous concretions.

Pathology.—In the acute gonorrhœal stage it is probable that the lesion of the mucous membrane is similar to that of gonorrhœa of the urethra. In the main, the morbid process consists of swelling of the mucous membrane and small round-cell thickening in the submucous connective tissue. The vesicles then may be much dilated, or, again, they may, by contraction of the newly-formed tissue, become much shrivelled.

Prognosis.—In the acute form of this trouble resolution usually takes place. In the chronic forms amelioration and cure may be

obtained. In some cases, however, the morbid process goes on to the formation of large tumors which require operative measures.

Treatment.—When recognized in the acute stage, seminal vesiculitis is to be treated on the general principles which govern the management of acute inflammation of the genito-urinary organs. Rest in bed, alkaline mixtures, and gentle purgation are necessary. Leeches may be used quite freely around the margin of the anus and over the perineum. Rectal irrigations of cold or hot water by means of Kemp's double-current hard-rubber irrigator may be administered several times a day if they are grateful to the patient and allay inflammation. Opium and belladonna suppositories may be employed if necessary to relieve pain and tenesmus.

Should an abscess form, the patient is placed in the lithotomy position and the pus evacuated by means of a long incision, in the perineum just anterior (about three-quarters of an inch) to the anus, great care being taken that the membranous urethra, the prostate, and the rectum are not cut. In this operation much aid will be given by means of the finger in the rectum and a sound in the urethra. The incision may be made in the median line laterally, or, if both vesicles are the seat of acute suppuration, it may be crescentic. Then the dissection between the base of the bladder and the rectum must be cautiously made.

In the treatment of chronic seminal vesiculitis, in which we may find distended pouchy vesicles, benefit may result from massaging the vesicles. This procedure is accomplished by the finger-tip gently but firmly pressing or kneading as much of the organ as is within reach from above downward, so as to express the contents through the ejaculatory duct into the prostatic urethra.

Cases of chronic seminal vesiculitis in which there is neurasthenia, debility and often great mental depression belong largely to the domain of general medicine. Such cases require good hygiene—if possible an entire change of scene, rest, and pleasant surroundings. Tonics combined with nux vomica and ergot produce much benefit. Iron, quinine, and coca are also indispensable in some cases. The urethra, bladder, prostate, and seminal vesicles should be very carefully examined by instruments and by inspection of the urine. If there is, as so frequently happens, a coexistent posterior urethritis, this should be properly treated.

EPIDIDYMITIS AND EPIDIDYMO-ORCHITIS.

The most frequent complication of gonorrhœa is an inflammation of the epididymis which may be sharply limited to that appendage or it may also involve the testicle. The former is called "epididymitis," and the latter "epididymo-orchitis," and both are known under the

title "swelled testicle." In some cases of swelled testicle there is a concomitant inflammation of the vas deferens in more or less of its extent, and to this phlegmasion the terms "deferentitis" and "funiculitis" have been applied. This complication is also called, less correctly, "inflammation of the spermatic cord" when that portion near or in immediate continuity with the epididymis is involved. Acute inflammation of the tunica vaginalis, or vaginalitis, with a greater or less amount of effusion, also occurs in cases of swelled testicle, particularly when the morbid process is centred in the epididymis.

There is very frequently in cases of epididymis and epididymo-orchitis a swollen and painful condition of the vas deferens as it leaves the epididymis and ascends. This swelling of the vas may extend an inch and even more up the tube. It is usually lost sight of by reason of the greater prominence and painfulness of the testicular phlegmasia.

Swelled testicle, therefore, may consist only of inflammation of the epididymis; but this is usually complicated with acute inflammation and more or less copious effusion into the cavity of the tunica vaginalis. This combination, with in some cases some involvement of the vas deferens, constitutes the majority of the cases of swelled testicle from gonorrhœa. The less common combination is inflammation of the epididymis and testis, in which case the tunica vaginalis is very apt to be affected, with perhaps a limited invasion of the vas deferens.

As regards the date of the onset of swelled testicle, it may be said that within the first three weeks of gonorrhœa the testis is attacked in the majority of cases, and that between the fourth and sixth weeks, inclusive, it is attacked rather less frequently.

Double epididymitis sometimes occurs, in which case usually the second testis is attacked from one to three weeks after the first one. In some cases, however, the second testicle is not involved until later—eight, ten, or even twelve weeks. An epididymis or testis once the seat of gonorrhœal inflammation is thereafter very liable to be affected with each repetition of the infection, and also when a chronic deep urethral inflammation undergoes an exacerbation and an acute condition results. Further than this, mechanical injury, overexertion, undue pressure on the testis, may for years after light up a more or less severe recrudescence.

Cases have been reported in which epididymis developed from three to ten days before the appearance of the urethral discharge. These cases used to be looked upon as curiosities, and the pathological conditions underlying them were not clearly grasped. Their pathogenesis, however, is not difficult of explanation. In all such cases there has been a previous antecedent gonorrhœa which has left a latent posterior urethritis. In sexual and alcoholic excesses this latent condition

becomes an acute one, and for some reason, perhaps anatomical, the phlegmasia travels through the ejaculatory duct into the testis before it spreads forward and invades the anterior urethra.

Symptoms.—Before the onset of the affection the urethral discharge usually, but not always, ceases, and patients complain of varying symptoms. In some, pain in the groin, at the external ring, and along the vas deferens, either in the external or in the pelvic segment, is complained of. In somewhat rare cases pain is experienced in the whole length of the vas deferens. Some patients even complain of a pain which reaches to the kidney. In some cases the pain seems to be at first in the deep urethra or in the seminal vesicles, and these patients sometimes suffer from pollutions which may be painful and bloody. In general, there are no premonitory constitutional symptoms, but as the intensity of the inflammation increases a chill and fever of various degrees, with malaise, want of appetite, great thirst, a frequent desire to urinate, and perhaps constipation, may supervene. As a rule, the systemic reaction is not great, but in very severe cases, and particularly those in which the vas deferens is involved, there may be well-marked fever with all its concomitants—namely, hot skin, coated tongue, rapid pulse, together with nervousness and agitation. In some rare cases there are nausea and vomiting. The invasion of the affection may be prompt or slow. Many patients walk and attend to their duties with mild and bearable discomfort for one or more days before they are forced to assume the recumbent position. In other cases, particularly those in which one or more exciting causes are active, the affection is well under way and the patient on his back within twenty-four hours. Early examination of a case shows that the epididymis, with perhaps the vas, is swollen and painful, and that the scrotum over it is somewhat reddened. In some cases the pain and swelling are confined to the globus minor or tail of the epididymis, which becomes of the size of a hickory-nut, and the affection may thus be limited; usually, however, the body and globus major or head of the organ are promptly involved. Then a large tumor is found seated superiorly and posteriorly to the testis, and the furrow which naturally exists between that organ and the epididymis may be present or it may be obliterated. The shape of the tumor varies in different cases. The epididymis, becoming enlarged, may cover the testis like a cap, or it may grow longitudinally and form a semilunar tumor, which rests on the organ like a crest on a helmet, the head of the appendage reaching well forward and the tail well upward. There is also usually more or less lateral expansion of it, sometimes almost enveloping the testis. Pressure on the testis in such a case usually causes no pain, but when the swollen epididymis is held between the thumb and forefinger the patient winces

or cries out. While at rest in the horizontal position, with the scrotum well supported, the patient may be tolerably comfortable. Coincidently with this inflammation, the scrotum on the affected side becomes of a deep, even purplish, red, very much swollen from œdema, and adherent to the testis. Pain is at this time severe, sometimes almost unendurable, and continuous, with paroxysms at night. Slight motion tends to increase the patient's sufferings, and pressure of the bedclothes causes agony. Coincident involvement of the cord is attended with a still greater amount of pain, which extends up to the inguinal canal. In these very severe cases the testicle is also, as a rule, the seat of inflammation. When the epididymis alone is inflamed, the swelling is very considerable; but when it and the testis are involved, it is great, so that a tumor the size of a small fist is formed. The testis will be found to be very painful and tender, and a much larger area of the scrotum will become inflamed, thickened, and of a deep red. While at first there is only moderate and localized adhesion of the upper portion of the organ to the scrotal wall, when epididymo-orchitis is present, there is adhesion of a large surface corresponding to the size of the swollen testicle. In proportion as the testicular inflammation is great, the tunica vaginalis becomes affected and the seat of serous effusion, by which the size of the tumor is materially increased. With this concomitant the acme of the inflammation may be said to be reached. The patient then will complain of pains in the perineum, in the thighs, the groins, and the lumbar regions. In some cases patients complain bitterly of deep pelvic and rectal pains, which are due to a complicating inflammation of the seminal vesicles.

In the acute stage particularly, and also in the period of decline of epididymo-orchitis, examination of the prostate, and sometimes the seminal vesicles, by means of rectal touch will in many cases reveal swelling and congestion of those organs, sometimes in their totality, and again on the side corresponding to the testicular inflammation. Swelled testicles may exist in a severe form from one to five days in untreated cases, when subsidence of the inflammation begins. In carefully-treated cases the intensity of the symptoms need not last longer than twenty-four or thirty hours. The first symptoms of improvement is amelioration of the pain, and soon it is noticed that the patient can move in bed with more freedom than before. The redness and œdema of the scrotum become less, and its adhesion gradually passes away, and the swelled organ becomes smaller and can be more freely manipulated. The swollen epididymis may be quite clearly made out, the testis can be distinctly felt, and if any hydrocele is present, it may be detected by palpation or perhaps by the light test. As a rule, the course of swelled testicle in bad cases occupies from ten to fourteen days, during which

time the patient will have been confined to his bed. At the end of this time, though he may go about, he is far from well, and should be looked after with the most careful attention. Unless removed by tapping, the hydrocele remains for a long period, and while it does the testis remains swollen and tender. When there is no hydrocele the testis is found to become gradually smaller and softer, and soon the line of demarcation between it and the epididymis can be made out. During this period of involution the epididymis also grows smaller, but much more slowly, and for longer or shorter periods it is found to be enlarged and indurated. Its continuance in this state is governed largely by the duration and intensity of the inflammation. So rapid and complete is the involution of the swelling of the epididymis in some cases that it seems scarcely credible; in others it is slow, occupying several months; while in others permanent enlargement and induration are left. In severe cases—luckily, not common—the testis, tunica vaginalis, epididymis, and vas deferens are left in a state of induration and chronic subacute inflammation.

In a normally-placed testis little difficulty is experienced in determining the extent and localization of the inflammation, but it must be remembered that exceptionally there exist malpositions of the epididymis, when confusion may occur. The most common form of malposition is where the epididymis is placed anterior to the body of the testis, in which the features observed in the normal testis would be reversed. Then it may be seated on one side, either external or internal, in which event the diagnosis need not be difficult. In the third variety the epididymis and vas deferens are attached superiorly, the long axis of the testis being in the anteroposterior direction. In a fourth variety the epididymis and vas deferens form a loop or sling from before backward around the testis. It is always important to make a correct estimate of the position of the parts, particularly if puncture of the tunica vaginalis is decided upon. It is a good rule to find the vas deferens high up in the scrotum, and if practicable to trace it downward between the tips of the thumb and fore-finger.

Sometimes, even when the epididymis is normally placed, its weight and bulk are so much increased by inflammation that it falls downward and forward with the testis above it. Examination then reveals the tail of the epididymis anteriorly and the head posteriorly, the organ hanging anteroposteriorly in the scrotum. Then, again, owing to the heaviness of the epididymis, it sinks down to the bottom of the scrotum, and the testis then lies directly on top of it.

Gonorrhœal inflammation, when it attacks an undescended or misplaced testis, has frequently been unrecognized.

Gonorrhœal inflammation of the vas deferens outside of the inguinal

canal, without involvement of the corresponding testis, is a rather rare complication and presents in the main the symptoms of epididymitis.

Localized inflammation of the vas deferens within the pelvis sometimes occurs, and causes much deep-seated pain during acute gonorrhœa. In some cases the swelling can be made out by physical examination. In other cases the swelling is inaccessible, but the history of the case and the symptoms point to involvement of the vas. Sometimes the surgeon suspects the case to be one of intrapelvic abscess.

Induration of the epididymis following gonorrhœal inflammation may be limited to the tail, to the head, or may involve the whole appendage. In some cases it is absorbed, and in others it remains permanently. It sometimes feels like a little mass of firm structure of roundish or ovoid shape when seated at either head or tail. In general, the swelling is not very large, but it may remain for a long period localized to the head, and be nearly as large as the testis. In some cases, when the whole epididymis is chronically indurated, it forms a half-moon-shaped mass whose bulk is greater than that of the gland. The most frequent form of induration of the epididymis is that in which the part is about as thick as a lead pencil or a peanut. It is hard to say which is the more frequently found—induration of the head or the tail of the epididymis. Hard enlargement of the whole appendage is less common than the localized induration.

The surface of simple gonorrhœal induration of the epididymis is usually smooth or of rounding or waving outline, in marked contrast to the nodulated and angular feel of tubercular epididymitis. In chronic syphilis the epididymis is sometimes enlarged in whole and in part, and the general outline of the swelling is much like that of the gonorrhœal affection.

The fact that induration of the epididymis may lead to occlusion of the seminiferous ducts emphasizes the necessity for prompt and vigorous treatment.

Abscess of the testis is a not frequent complication of gonorrhœal epididymo-orchitis, the focus of the trouble being usually in the epididymis. In these cases of abscess of the epididymis or testis following gonorrhœa a suspicion of tuberculosis is warranted, and the patient should be well looked after and placed in the best of hygienic conditions. Cysts in the epididymis sometimes follow swelled testis, and are sometimes the seat of acute pain, and may be mistaken for circumscribed abscesses.

Abscess of the body of the testis somewhat rarely occurs during gonorrhœal epididymo-orchitis and it may lead to fungus and hernia testis.

Gangrene of the scrotum is a rare complication, and it usually begins,

particularly in cases which have been poulticed, at a dependent portion of the sac as a black spot, which spreads and destroys more or less of the walls, laying bare the testis or testes, which, however, are not invaded. After the cessation of the gangrene the parts usually heal and cover the organs again, unless the destruction has been very extensive. Gangrene of the scrotum may follow gangrene of the testis.

Neuralgia is a not uncommon sequela of swelled testicle. It may exist as a slightly painful sensitiveness of the organ and along the cord, particularly on pressure or during active motion, or as a rather dull pain subject to irregular and fugitive paroxysms. Usually, in these cases the epididymis is found to be enlarged and very sensitive. It is commonly seen in weak, sickly subjects, particularly those of neuropathic tendency, and subjects given to worry and fretting.

Reflex neuralgias are not infrequent complications and sequelæ of swelled testicle. The pain is generally unilateral and confined to the territory supplied by the lumbar and sacral nerves of the affected side, but may cross the median line and extend in various directions.

Patients who have suffered from epididymitis, particularly those in whom relapses have been frequent and whose epididymes are thickened, are prone to engorgement and gummatous infiltration of these parts if they subsequently contract syphilis. The same tendency is observed in cases in which the testis proper has been inflamed during gonorrhœa. Chronically inflamed and indurated epididymes sometimes become the seat of caseous degeneration, and in sickly, scrofulous, and tuberculous subjects tuberculosis may attack them.

Atrophy of the testis has been known to occur in a few cases following orchi-epididymitis, and hypertrophy is not very uncommon, particularly in subjects who have had repeated attacks of the affection.

Chronic hydrocele is frequently caused by swelled testicle.

Causes of Epididymitis and Epididymo-orchitis.—Gonorrhœa being the predisposing cause, various exciting causes are often the starting-points of the trouble. These are the early use of strong injections, particularly when used to abort the disease, and the precocious administration of copaiba, cubebs, and oil of santal; indulgence in alcoholic stimulants; and sexual excitement, with or without coitus, since men, either from lust or with a mistaken idea that they may thus rid themselves of their trouble, often have connection while suffering from gonorrhœa. In the majority of cases, walking, activity in business, lifting heavy weights, pulling violently, dancing, and riding, particularly on horseback, bicycling, skating, are the immediate causes. Passage of sounds and catheters toward the decline of gonorrhœa is frequently followed by epididymitis. Consequently, such instrumentation should not be adopted in the declining stage of gonorrhœa, or when

stricture of the urethra is followed by a mild and ephemeral epididymitis or epididymo-orchitis.

Diagnosis.—Commonly, no difficulty is experienced in the diagnosis of swelled testicle, since the history of the case and the nature of the lesion are so clear. In those rare cases of acute hydrocele doubt might exist, but it would be soon dispelled by a consideration of the history of the case and an examination of the parts. Swelled testicle, with redness and œdema of the scrotum, is said to have been mistaken for erysipelas of that pouch. Such an error will rarely occur, and with ordinary care will be promptly found out. Hæmatocele of the tunica vaginalis may at first resemble gonorrhœal swelled testicle, but the history of traumatism will settle the question. The same remarks apply to orchitis of traumatic origin.

In epididymo-orchitis, or epididymitis accompanied by inflammation of the cord as far as the external ring, a mistaken diagnosis of hernia may be made, particularly when there is much fever, with constipation and vomiting, as sometimes occurs. The error need not be of long duration, since in the scrotal lesion there is a history of gonorrhœa, while in hernia there is usually a history of a fugitive or permanent tumor in the groin, and perhaps of antecedent inflammation or strangulation of the hernial sac.

Epididymitis of a misplaced or undescended testis sometimes is difficult of recognition. In such cases the history of a urethral discharge should cause suspicion, when the examination of the scrotum will show absence of one testis. It must be remembered that the testis may be retained within the abdominal cavity, in the inguinal canal, and that it may be found in the perineum.

In all cases it is of importance to assure one's self of the relation of the epididymis to the testis, since puncture of the tunica vaginalis is so frequently necessary. It is important to ascertain whether inversion of the epididymis is present, since puncture under these circumstances might wound or destroy the vas deferens. In swelled testicle the seat of inversion the tumor is long anteroposteriorly, with the epididymis well forward and the testis under and rather behind it.

In cases of inflammation of the vas deferens it is well to seek it as it leaves the tail of the epididymis, and trace it until it will be found to be lost in the swollen meshes of the cord, since it may not be possible to examine it as it escapes from the canal. The diagnosis of these cases is more difficult when the portion of the cord between the external and internal rings is also swollen.

Prognosis.—The prognosis of swelled testicle from gonorrhœa is, in the main, good, since more or less complete resolution generally occurs. It depends, however, largely upon the promptness and efficiency of the

treatment and on the nature of the patient. Careless habits, intolerance of restraint, and poor fibre tend to make the prognosis more serious. The occurrence of the various structural complications already detailed, and the supervention of the various neuralgias, of course make the condition more serious. The fecundity of a man is not imperilled by induration of one epididymis and the occlusion of its vas deferens, but the total occlusion of both of these ducts renders him sterile. Though his procreative power is lost, his ability to copulate remains. The question of the sterility of a man often becomes an important matter in domestic relations. It must not be stated without absolute positiveness that when no spermatozoa are found in the semen a man is absolutely sterile, since it may be that there is present a temporary stenosis due to exudation, and for the reason that under treatment resolution of the infiltration may be produced. It is only in cases where the semen examined over long periods is found to be wanting in spermatozoa that the existence of absolute sterility may be asserted.

The prognosis is always better when the lesion is seated in the head of the epididymis, and correspondingly worse when in the tail, since in that event the spermatic vessels have converged to form one tube—the vas deferens. Since relapses of epididymitis frequently have their origin in chronic subacute, deep-seated urethral inflammation, their occurrence will suggest the necessity of the removal of the cause. Apart from the varying conditions of the morbid process as influencing the prognosis, the latter largely depends on the treatment of the testicular disorder in its declining and chronic stages. If in these periods active conservative treatment is followed, full resolution may be obtained in the majority of cases.

Treatment.—Absolute rest in bed is the first indication in the treatment of the severe form of gonorrhœal epididymitis. The next indication is to place the swollen organ in a position of rest and comfort; and for this the suspensory bandage is generally useless. A number of excellent procedures are at our command. The simplest is to form an immovable platform or shelf on which the organ may rest. This may be done with India-rubber adhesive plaster; and though regarded as dirty and objectionable by some, it by a little trouble can be made cleanly and serviceable. A sufficiently long strip of adhesive plaster, three to five inches wide, is placed across the thighs of the recumbent patient so high up that its superior border touches his perineum, whose scrotum for the moment has been carefully lifted toward the body. While sufficient adhesive surface is applied to the thighs, that portion of the plaster which forms the bridge between them may be covered with gutta-percha tissue, which, being folded under, adheres to the adhesive plaster. Another efficient method requires a soft linen or silk

handkerchief, which should be folded diagonally so as to form a triangle, in the centre of the base of which two pieces of tape are to be sewn. Having placed a firm waistband around the body just above the iliac crests, the scrotum is elevated and the centre of the base of the handkerchief triangle is placed in accord with the raphé of the scrotum. The tapes are carried around the thighs on either side, and are secured by the waistband near the iliac crests. Having thus rendered the bandage firm, the two outer ends of the handkerchief are brought upward along the folds of the groin and secured to the waist-bandage, while the apex of the handkerchief triangle is brought upward in the median line and also secured to the band. By these means the testes may be kept at rest and any form of application may be used.

What is known among athletes and actors as the jock-strap is also very useful in cases of swelled testicle either when the patient is in bed or on foot.

The scrotum may also be supported by a wad of oakum or absorbent cotton placed between the thighs.

The next indication is to administer a brisk cathartic in the form of pills or a powder of from five to ten grains of calomel and bicarbonate of soda. The diet must be mild and sparing, preferably of milk or of toast and weak tea. Little internal medication is necessary, though the mixture of bicarbonate of potassa with tincture of hyoscyamus may be given.

In some severe cases a goodly number of leeches may be applied to the groin as far down as the scrotum.

For the relief of pain, particularly at night, some preparation of opium may be used in the form of pill, suppository, or hypodermic injection. Salicylate of soda has been exploited as a valuable remedy in these cases, but it has failed utterly in my hands to comfort the patient or affect the phlegmasia in any way.

In general, a strong lead-and-opium wash, perhaps combined with muriate of ammonia, and applied to the organ properly fixed on old linen or lint, or absorbent cotton or gauze, is a most efficient and reliable remedy. At the onset of the affection ice, guardedly applied, may be used. For this purpose an ice-bag may be employed.

In some cases cold applications are not grateful, and in them hot tobacco poultices will prove very efficacious.

The following ointments are often of service when spread thickly on lint:

℞.	Pulv. opii,	ʒij;
	Pulv. camph.,	ʒss;
	Vaseline or glycerini,	℥j.—M.

And

℞. Pulv. opii,
Pulv. amyli, āā ℥j;
Glycerini, q. s.
Ft. paste of the thickness of tar.

When the intensity of the inflammation is on the wane, due to the use of either heat or cold, a more radical treatment may be followed. Every effort must be made to cure the inflammation of the deep urethra. One of the most beneficial is the application at white heat of Paquelin's cautery over the scrotum corresponding to the swelled testicle. The parts must first be shaved and thoroughly washed. The tip of the cautery may then be applied rapidly and but for a second or two in ten or twelve spots well separated from each other. The scrotum is then to be enveloped in absorbent cotton and put in a comfortable bandage. The cautery may be used every two, three, or four days. The effect will usually be promptly seen in the amelioration of the symptoms and the subsidence of the swelling.

Very much benefit and comfort can be obtained by the aseptic withdrawal of fluid from the cavity of the tunica vaginalis by means of a hypodermic syringe just as soon as it can be done.

Another method of treatment in the declining stage is the application every day or two of a solution of nitrate of silver (60 or 120 grs. to the ounce of water). The whole of the affected side is painted and the parts treated as directed after the cautery treatment.

In subacute and chronic cases an ointment composed of guaiacol and vaseline (10 or 15 to 100) may be used. Ichthyol ointment, 20 to 100, may cause resolution of the induration.

Strapping the testicle is never appropriate in the acute stage, though it may be beneficial in some cases of chronic swelled testicle. It is much less commonly employed now than formerly, owing to the fact that it is difficult of application, is not cleanly, loosens quickly, and often gives rise to fissures and inflammation of the skin. The scrotum must be smoothly shaved before the plaster is applied. Mercurial, belladonna, or the plain rubber adhesive plaster may be used in strips of three-quarters of an inch in width.

Another method of strapping is carried out as follows: the testis is grasped, around its upper portion a ring of adhesive plaster is fixed, and covered over with a piece of silk handkerchief, over which is a thick layer of absorbent cotton, and over that again a layer of gutta-percha tissue. Then over the whole strips of adhesive plaster are passed in a circular manner, so that the ends may be drawn more or less tightly before being fixed. About every twenty-four hours it is necessary to

tighten the adhesive strips. Removal of fluid from the tunica vaginalis is especially necessary in all cases before compression is applied.

In those extremely severe but quite rare cases in which the testis is also inflamed, together with serous effusion in the tunica vaginalis, prompt puncture of the sac is urgently called for, and is commonly followed by marked relief of the pain and tension in the organ. It is well to employ a small straight bistoury, and to make a number of minute punctures well down into the cavity of the tunica vaginalis, over its median and most rounded portion, taking care that the tunica albuginea is not wounded. When practicable, in these cases withdrawal of the fluid by the hypodermic syringe may be done.

The treatment of neuralgia of the testis following gonorrhœa, or indeed any morbid process, should be directed primarily to the affected part. Blisters with cantharidal collodion may produce much benefit. Paquelin's cautery and the various stimulating applications already detailed may be used. Opium and belladonna ointment may also be of service, according to the symptoms. If any thickening of the epididymis or cord can be made out, it should receive energetic treatment on the lines followed in treating induration of the epididymis. In every case the condition of the deep urethra should be ascertained, and if any inflammation be found, it should be treated. Any general morbid condition should be carefully considered, and proper medication and hygiene should be instituted.

Induration of the epididymis and enlargement of the testis, which sometimes follow gonorrhœa or other morbid processes, require some of the foregoing methods of treatment. Stimulation and compression are especially indicated. Strapping the testis and the use of the other compressing agents should be employed. In some cases benefit follows the synchronous use of iodine or iodide-of-lead ointment. In some cases of chronic induration of the testis and epididymis, not due to syphilis, mercurial ointment with compression will produce resolution. Then, again, I have seen great benefit follow the combined use of mercurial ointment and the mixed treatment, though the induration was wholly due to gonorrhœa, and not even remotely to syphilis. In obstinate cases it is always well to try this combination treatment. In all cases of swelled testicle it is necessary to cure the coexisting posterior urethritis.

GONORRHŒAL RHEUMATISM.

The term "gonorrhœal rheumatism" is applied to a complex inflammation, chiefly of the joints, fasciæ, bursæ, and tendinous sheaths, and also of the eye and fibrous tissues, which follows in the course of urethral gonorrhœa and gonorrhœal vulvitis, vaginitis, and conjunctivitis. It sometimes complicates urethral suppuration caused by instru-

mentation, even as simple as the passage of a sound. This form of rheumatism does not complicate balanitis or simple inflammations of the external genitals of the male or female.

Gonorrhœal rheumatism attacks men more frequently than women, and is seen in infants and in the young and the old. It has no etiological relation to a pre-existent rheumatic condition or diathesis, for the reason that we see many truly rheumatic subjects who may suffer from gonorrhœa without becoming affected with its rheumatism. This affection may follow each attack of gonorrhœa, but such a course is far from being the invariable rule, since many men have thus suffered once after gonorrhœa, and never again after subsequent infections.

The inflammatory process in gonorrhœal rheumatism is caused by the gonococcus and its toxins, but the morbid condition may be further complicated and aggravated by the concurrent or subsequent action of pyogenic microbes. Whether the cases presenting ordinary serous effusion are due to the gonococcus alone or its toxic products, and whether the cases of articular and fibrous-tissue abscesses are due to the action of the gonococcus, aided by that of pus-microbes, we cannot to-day state with scientific precision. The results of observation seem, however, to show that when the joint-effusion is serous or serofibrinous the gonococcus is found in it, and that when it is seropurulent or purulent pyogenic microbes are found. There seems to be sufficient evidence at hand to warrant the statement that in many cases the pyogenic microbes dominate in the phlegmasia, and thus the gonococci perish in whole or in part.

It is very difficult to state definitely the date of the onset of gonorrhœal rheumatism. Though we have not absolute knowledge on the subject, it is probable that absorption of septic material does not take place until the infection has reached the posterior urethra. It is usually in the older and more chronic cases of gonorrhœa that its rheumatism appears; consequently we more frequently see it develop in one, two, three, and four months after the beginning of the infection, and even later.

Besides the joints, other structures are frequently involved in gonorrhœal rheumatism, either in combination with the joint-lesions or as special inflammations. The bursæ are quite frequently attacked. The bursa in front of the tendo Achillis and the one beneath the os calcis are most frequently involved, while those of the wrist, ankle, the patella, the tuber ischii, the bicipital, and of the psoas muscle are less commonly attacked. The tendinous sheaths may be affected in gonorrhœal rheumatism, either alone or in combination with joint-lesions. The sheaths most commonly the seat of the inflammation are the extensors of the hands and fingers, the dorsal flexors of the toes and the flexor pollicis,

the sheaths of the biceps brachii, and of the tendo Achillis. The external fibrous structures and ligamentous tissues of joints, particularly the large ones of the knee and the elbow, are not infrequently involved by this form of rheumatism, which is called periarticular gonorrhœal rheumatism. This may also be said of smaller joints, such as of the hands, feet, and toes. In these cases there is no intra-articular phlegmasia. The plantar and palmar fascia are quite rarely the seat of gonorrhœal inflammation.

The essential lesion of the joints is an inflammation of their synovial membrane, which may result in serous synovitis, serofibrinous synovitis, seropurulent synovitis, which are the more common forms, and purulent synovitis, which is quite rare. Gonorrhœal rheumatism is essentially an hydrarthrosis, and in very many instances the disease is confined to the synovial membrane of the joint during the whole course of the affection.

In some cases the discharge ceases when the rheumatism begins; in others it is increased before its onset, and in still other cases there is no alteration in its course.

Acute inflammation of one joint, particularly of the knee, and called gonitis, is the most common form of gonorrhœal rheumatism. This form is called acute monoarticular gonorrhœal rheumatism. In this affection there may be no premonitory symptoms whatever, and the patient's first complaint will be that his joint is rather painful and that he limps slightly. In other cases there is a slight chill and fugitive pains over the body, with malaise and mild fever. These symptoms usher in the hydrarthrosis. In more severe cases these symptoms are much accentuated. Cases occur in which there is mild delirium, with a condition resembling typhoid fever in its third week. Again, there are rare cases in which the patient is stupid, dull, heavy, and very feverish (temp. 102° to 105° Fahr.), and presents the appearance of profound septic intoxication. The symptoms may, therefore, be very mild, quite severe, and exceptionally very severe and even grave in character. The acme of the constitutional symptoms is generally reached within a week, and from that time onward they range in about the same degree of mildness or severity. Sweating, so common and so copious in ordinary rheumatism, is not observed to any marked extent in the form under consideration.

In general terms, it may be stated that the symptoms are rather mild in cases of serous effusion, rather more severe when the effusion is serofibrinous, and most severe when it is seropurulent or purulent.

The pain in the joint is at first slight, but it speedily increases in intensity, particularly if the patient continues to go about. The evidences of serous effusion into the joint are soon seen. If the knee-joint

is affected, the patella is soon elevated above the level of the femur, and two fluctuating cushions may be seen on each side of its upper portion and over the lower extremity of the femur, and two similar ones on each side of its lower portion over the head of the tibia. The patella floats in the fluctuating cushion, and if pressed downward it rebounds with a distinct click. With the onset of the effusion heat, redness, and swelling are observed in the investing integument. In many acute cases there is no perceptible thickening in the fibrous structures around the joint. In the chronic form this extra-articular condition may be observed. In the acme of the affection the joint is much enlarged and distended, the skin is red and tense, and there is pain which may be dull and continuous or throbbing and stabbing. In many cases the pain is worse at night. As the phlegmasia in the joint increases the limb becomes more and more immobile.

This monoarticular form of gonorrhœal rheumatism may constitute the whole affection, but in some cases other joints become involved. When the disease thus spreads, there is no abatement of the morbid process in the joint first affected, but there may be an intensification of the general symptoms. Under favorable circumstances the acute dropsy of the joint, in the monoarticular form, subsides in from four to six weeks, but if the morbid process is more severe and the exudates are serofibrinous, seropurulent, or purulent, then the duration is much longer—we may say indefinite.

Monoarticular gonorrhœal rheumatism, also called gonocele, may begin in a slow and subacute manner, and may then develop into a chronic affection. In this event the patient experiences very little pain, and only some inconvenience in walking and moving the joint. Sooner or later he discovers that the joint is enlarged and the seat of serous effusion. There is no extra-articular inflammation and no general systemic reaction. In this condition the joint may remain for many months. In some cases visible improvement may be noted, which is usually followed by an exacerbation of a low grade. In this way the case may hitch and halt until inflammatory changes in the synovial membrane and articular surface, and even the bones, are developed and arthritis deformans results.

The less common form of gonorrhœal rheumatism is that in which, as a general rule, two or three, and exceptionally many, joints are involved, and it is called polyarticular acute gonorrhœal rheumatism. The symptom-complex of this form resembles that of the monoarticular form. The course of this joint-affection, however, is different. Sometimes during the course of the inflammation in the first joint a second one is attacked, but there is usually no marked amelioration in the condition of the first. With each joint-involvement the symptoms may

undergo an exacerbation, which is soon followed by a remission; and thus the case progresses until several or many joints are involved. Usually the number of joints involved is not as great as in articular rheumatism. I have, however, seen a case in which every joint of the body, even the temporomaxillary articulation, was thus involved, and as a result became ankylosed.

In this form also there is usually not the painful thickening of the fibrous tissues around the joint which is such a marked feature of articular rheumatism. The disproportion between the general symptoms and the joint-lesions is so marked in gonorrhœal rheumatism, and in such contrast with what occurs in acute articular rheumatism, in which the symptoms are severe and striking, that the nature of the complaint is readily determined.

The **course** of this form of rheumatism depends largely on the nature of the effusion and of the exudates. If the lesion is simply a serous effusion, the affection may last two, three, or many months. If it is serofibrinous, it may last longer; and if seropurulent or purulent, the course may be indefinite.

Chronic dropsy of the joint, more or less disorganization, and even ankylosis, may result. In very chronic cases atrophy of the muscles connected with the diseased joints may occur.

As **complications** of the polyarticular form of gonorrhœal rheumatism we sometimes see sclerotic iritis, aquo-capsulitis, bursitis, and inflammation of tendinous sheaths.

There are certain minor forms of gonorrhœal rheumatism which may or may not present conspicuous objective and subjective symptoms. These are inflammations of tendinous sheaths, of bursæ, of fasciæ, and of the extra-articular structures. The tendinous sheaths may be affected alone or synchronously with the joints. Those most commonly attacked, are, as before stated, the extensors of the hands and fingers, the dorsal flexors of the toes and the flexor pollicis, the sheaths of the biceps brachii, and the tendo Achillis. The visible signs of this affection are redness and swelling along the course of the tendon. This elongated phlegmasia is more or less painful, and causes more or less functional impairment of the part affected. So commonly is this condition due to gonorrhœa, and so strikingly in contrast with the phlegmasic non-painful tendinitis due to syphilis, that its nature will be readily perceived. Tuberculous inflammation of these structures may be attended with an acuteness of symptoms, objective and subjective, which may suggest gonorrhœa as their origin. This point should always be borne in mind.

Inflammation of bursæ due to gonorrhœa shows itself, at first, as a localized red and rather painful swelling of the part. If the affection becomes chronic, the redness in a measure disappears and the part be-

comes less painful. The bursæ of the tendo Achillis, of the os calcis, wrist, ankle, patella, and tuberosity of the ischium, are the ones most commonly attacked. This affection may be acute, subacute, and chronic in course.

It is not uncommon to find concomitant inflammation of tendinous sheaths and of bursæ in the course of polyarticular acute gonorrhœal rheumatism.

Inflammation of the investing structures of joints, and sometimes of the ends of large and expansive tendons, is a rather infrequent form of gonorrhœal rheumatism, and is termed arthralgia. This condition may exist alone or in conjunction with a more extended development of the disease. It may attack the outer surface of one or more large joints in whole or in part. There may or may not be redness and swelling, but there commonly is pain of an acute, aching, persistent character. The area of pain may be limited to an inch or more of tissue, and it may be extensive. There is usually an absence of general symptoms. This affection may last several weeks, and even months, but it generally yields to vigorous counter-irritation.

During the course of polyarticular gonorrhœal rheumatism the fibrous sheaths of muscles and their fasciæ are sometimes attacked. In old and broken-down subjects, the victims of very chronic and sometimes never-ending gonorrhœal rheumatism, after one, several, or many of their joints have become ankylosed, the disease goes on and on, attacking the fibrous structures of muscles and bringing about their atrophy. In such cases also we may find persistent arthritis of the bones of the hands and feet, which results in permanent disfigurement and sometimes great deformity.

In some cases of chronic gonorrhœal rheumatism sciatica, mild or severe, may occur.

Diagnosis.—In many cases the existence of a gonorrhœa or the history of a comparatively recent attack will suggest the nature of the case under observation. In the main, the absence of sweating and the comparatively mild systemic reaction (in the majority of cases) will suggest gonorrhœa as the cause of the rheumatism. Then the predilection of the disease to attack the larger joints, particularly of the knee, ankle, wrist, and shoulder, and to invade only one, two, or three joints, is indicative of gonorrhœa as its cause. Hydrarthrosis is common in gonorrhœal rheumatism, and is infrequent and slight in the ordinary form of the disease. The absence of a history of rheumatism is also significant of urethral suppuration as a cause. The coincident involvement of tendinous sheaths, fasciæ, and bursæ, with perhaps the iris and conjunctiva, is a strong point against the case's being one of ordinary inflammatory rheumatism.

tighten the adhesive strips. Removal of fluid from the tunica vaginalis is especially necessary in all cases before compression is applied.

In those extremely severe but quite rare cases in which the testis is also inflamed, together with serous effusion in the tunica vaginalis, prompt puncture of the sac is urgently called for, and is commonly followed by marked relief of the pain and tension in the organ. It is well to employ a small straight bistoury, and to make a number of minute punctures well down into the cavity of the tunica vaginalis, over its median and most rounded portion, taking care that the tunica albuginea is not wounded. When practicable, in these cases withdrawal of the fluid by the hypodermic syringe may be done.

The treatment of neuralgia of the testis following gonorrhœa, or indeed any morbid process, should be directed primarily to the affected part. Blisters with cantharidal collodion may produce much benefit. Paquelin's cautery and the various stimulating applications already detailed may be used. Opium and belladonna ointment may also be of service, according to the symptoms. If any thickening of the epididymis or cord can be made out, it should receive energetic treatment on the lines followed in treating induration of the epididymis. In every case the condition of the deep urethra should be ascertained, and if any inflammation be found, it should be treated. Any general morbid condition should be carefully considered, and proper medication and hygiene should be instituted.

Induration of the epididymis and enlargement of the testis, which sometimes follow gonorrhœa or other morbid processes, require some of the foregoing methods of treatment. Stimulation and compression are especially indicated. Strapping the testis and the use of the other compressing agents should be employed. In some cases benefit follows the synchronous use of iodine or iodide-of-lead ointment. In some cases of chronic induration of the testis and epididymis, not due to syphilis, mercurial ointment with compression will produce resolution. Then, again, I have seen great benefit follow the combined use of mercurial ointment and the mixed treatment, though the induration was wholly due to gonorrhœa, and not even remotely to syphilis. In obstinate cases it is always well to try this combination treatment. In all cases of swelled testicle it is necessary to cure the coexisting posterior urethritis.

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mentation, even as simple as the passage of a sound. This form of rheumatism does not complicate balanitis or simple inflammations of the external genitals of the male or female.

Gonorrhœal rheumatism attacks men more frequently than women, and is seen in infants and in the young and the old. It has no etiological relation to a pre-existent rheumatic condition or diathesis, for the reason that we see many truly rheumatic subjects who may suffer from gonorrhœa without becoming affected with its rheumatism. This affection may follow each attack of gonorrhœa, but such a course is far from being the invariable rule, since many men have thus suffered once after gonorrhœa, and never again after subsequent infections.

The inflammatory process in gonorrhœal rheumatism is caused by the gonococcus and its toxins, but the morbid condition may be further complicated and aggravated by the concurrent or subsequent action of pyogenic microbes. Whether the cases presenting ordinary serous effusion are due to the gonococcus alone or its toxic products, and whether the cases of articular and fibrous-tissue abscesses are due to the action of the gonococcus, aided by that of pus-microbes, we cannot to-day state with scientific precision. The results of observation seem, however, to show that when the joint-effusion is serous or serofibrinous the gonococcus is found in it, and that when it is seropurulent or purulent pyogenic microbes are found. There seems to be sufficient evidence at hand to warrant the statement that in many cases the pyogenic microbes dominate in the phlegmasia, and thus the gonococci perish in whole or in part.

It is very difficult to state definitely the date of the onset of gonorrhœal rheumatism. Though we have not absolute knowledge on the subject, it is probable that absorption of septic material does not take place until the infection has reached the posterior urethra. It is usually in the older and more chronic cases of gonorrhœa that its rheumatism appears; consequently we more frequently see it develop in one, two, three, and four months after the beginning of the infection, and even later.

Besides the joints, other structures are frequently involved in gonorrhœal rheumatism, either in combination with the joint-lesions or as special inflammations. The bursæ are quite frequently attacked. The bursa in front of the tendo Achillis and the one beneath the os calcis are most frequently involved, while those of the wrist, ankle, the patella, the tuber ischii, the bicipital, and of the psoas muscle are less commonly attacked. The tendinous sheaths may be affected in gonorrhœal rheumatism, either alone or in combination with joint-lesions. The sheaths most commonly the seat of the inflammation are the extensors of the hands and fingers, the dorsal flexors of the toes and the flexor pollicis,

the sheaths of the biceps brachii, and of the tendo Achillis. The external fibrous structures and ligamentous tissues of joints, particularly the large ones of the knee and the elbow, are not infrequently involved by this form of rheumatism, which is called periarticular gonorrhœal rheumatism. This may also be said of smaller joints, such as of the hands, feet, and toes. In these cases there is no intra-articular phlegmasia. The plantar and palmar fascia are quite rarely the seat of gonorrhœal inflammation.

The essential lesion of the joints is an inflammation of their synovial membrane, which may result in serous synovitis, serofibrinous synovitis, seropurulent synovitis, which are the more common forms, and purulent synovitis, which is quite rare. Gonorrhœal rheumatism is essentially an hydrarthrosis, and in very many instances the disease is confined to the synovial membrane of the joint during the whole course of the affection.

In some cases the discharge ceases when the rheumatism begins; in others it is increased before its onset, and in still other cases there is no alteration in its course.

Acute inflammation of one joint, particularly of the knee, and called gonitis, is the most common form of gonorrhœal rheumatism. This form is called acute monoarticular gonorrhœal rheumatism. In this affection there may be no premonitory symptoms whatever, and the patient's first complaint will be that his joint is rather painful and that he limps slightly. In other cases there is a slight chill and fugitive pains over the body, with malaise and mild fever. These symptoms usher in the hydrarthrosis. In more severe cases these symptoms are much accentuated. Cases occur in which there is mild delirium, with a condition resembling typhoid fever in its third week. Again, there are rare cases in which the patient is stupid, dull, heavy, and very feverish (temp. 102° to 105° Fahr.), and presents the appearance of profound septic intoxication. The symptoms may, therefore, be very mild, quite severe, and exceptionally very severe and even grave in character. The acme of the constitutional symptoms is generally reached within a week, and from that time onward they range in about the same degree of mildness or severity. Sweating, so common and so copious in ordinary rheumatism, is not observed to any marked extent in the form under consideration.

In general terms, it may be stated that the symptoms are rather mild in cases of serous effusion, rather more severe when the effusion is serofibrinous, and most severe when it is seropurulent or purulent.

The pain in the joint is at first slight, but it speedily increases in intensity, particularly if the patient continues to go about. The evidences of serous effusion into the joint are soon seen. If the knee-joint

is affected, the patella is soon elevated above the level of the femur, and two fluctuating cushions may be seen on each side of its upper portion and over the lower extremity of the femur, and two similar ones on each side of its lower portion over the head of the tibia. The patella floats in the fluctuating cushion, and if pressed downward it rebounds with a distinct click. With the onset of the effusion heat, redness, and swelling are observed in the investing integument. In many acute cases there is no perceptible thickening in the fibrous structures around the joint. In the chronic form this extra-articular condition may be observed. In the acme of the affection the joint is much enlarged and distended, the skin is red and tense, and there is pain which may be dull and continuous or throbbing and stabbing. In many cases the pain is worse at night. As the phlegmasia in the joint increases the limb becomes more and more immobile.

This monoarticular form of gonorrhœal rheumatism may constitute the whole affection, but in some cases other joints become involved. When the disease thus spreads, there is no abatement of the morbid process in the joint first affected, but there may be an intensification of the general symptoms. Under favorable circumstances the acute dropsy of the joint, in the monoarticular form, subsides in from four to six weeks, but if the morbid process is more severe and the exudates are serofibrinous, seropurulent, or purulent, then the duration is much longer—we may say indefinite.

Monoarticular gonorrhœal rheumatism, also called gonocele, may begin in a slow and subacute manner, and may then develop into a chronic affection. In this event the patient experiences very little pain, and only some inconvenience in walking and moving the joint. Sooner or later he discovers that the joint is enlarged and the seat of serous effusion. There is no extra-articular inflammation and no general systemic reaction. In this condition the joint may remain for many months. In some cases visible improvement may be noted, which is usually followed by an exacerbation of a low grade. In this way the case may hitch and halt until inflammatory changes in the synovial membrane and articular surface, and even the bones, are developed and arthritis deformans results.

The less common form of gonorrhœal rheumatism is that in which, as a general rule, two or three, and exceptionally many, joints are involved, and it is called polyarticular acute gonorrhœal rheumatism. The symptom-complex of this form resembles that of the monoarticular form. The course of this joint-affection, however, is different. Sometimes during the course of the inflammation in the first joint a second one is attacked, but there is usually no marked amelioration in the condition of the first. With each joint-involvement the symptoms may

undergo an exacerbation, which is soon followed by a remission; and thus the case progresses until several or many joints are involved. Usually the number of joints involved is not as great as in articular rheumatism. I have, however, seen a case in which every joint of the body, even the temporomaxillary articulation, was thus involved, and as a result became ankylosed.

In this form also there is usually not the painful thickening of the fibrous tissues around the joint which is such a marked feature of articular rheumatism. The disproportion between the general symptoms and the joint-lesions is so marked in gonorrhœal rheumatism, and in such contrast with what occurs in acute articular rheumatism, in which the symptoms are severe and striking, that the nature of the complaint is readily determined.

The **course** of this form of rheumatism depends largely on the nature of the effusion and of the exudates. If the lesion is simply a serous effusion, the affection may last two, three, or many months. If it is serofibrinous, it may last longer; and if seropurulent or purulent, the course may be indefinite.

Chronic dropsy of the joint, more or less disorganization, and even ankylosis, may result. In very chronic cases atrophy of the muscles connected with the diseased joints may occur.

As **complications** of the polyarticular form of gonorrhœal rheumatism we sometimes see sclerotic iritis, aquo-capsulitis, bursitis, and inflammation of tendinous sheaths.

There are certain minor forms of gonorrhœal rheumatism which may or may not present conspicuous objective and subjective symptoms. These are inflammations of tendinous sheaths, of bursæ, of fasciæ, and of the extra-articular structures. The tendinous sheaths may be affected alone or synchronously with the joints. Those most commonly attacked, are, as before stated, the extensors of the hands and fingers, the dorsal flexors of the toes and the flexor pollicis, the sheaths of the biceps brachii, and the tendo Achillis. The visible signs of this affection are redness and swelling along the course of the tendon. This elongated phlegmasia is more or less painful, and causes more or less functional impairment of the part affected. So commonly is this condition due to gonorrhœa, and so strikingly in contrast with the phlegmasic non-painful tendinitis due to syphilis, that its nature will be readily perceived. Tuberculous inflammation of these structures may be attended with an acuteness of symptoms, objective and subjective, which may suggest gonorrhœa as their origin. This point should always be borne in mind.

Inflammation of bursæ due to gonorrhœa shows itself, at first, as a localized red and rather painful swelling of the part. If the affection becomes chronic, the redness in a measure disappears and the part be-

comes less painful. The bursæ of the tendo Achillis, of the os calcis, wrist, ankle, patella, and tuberosity of the ischium, are the ones most commonly attacked. This affection may be acute, subacute, and chronic in course.

It is not uncommon to find concomitant inflammation of tendinous sheaths and of bursæ in the course of polyarticular acute gonorrhœal rheumatism.

Inflammation of the investing structures of joints, and sometimes of the ends of large and expansive tendons, is a rather infrequent form of gonorrhœal rheumatism, and is termed arthralgia. This condition may exist alone or in conjunction with a more extended development of the disease. It may attack the outer surface of one or more large joints in whole or in part. There may or may not be redness and swelling, but there commonly is pain of an acute, aching, persistent character. The area of pain may be limited to an inch or more of tissue, and it may be extensive. There is usually an absence of general symptoms. This affection may last several weeks, and even months, but it generally yields to vigorous counter-irritation.

During the course of polyarticular gonorrhœal rheumatism the fibrous sheaths of muscles and their fasciæ are sometimes attacked. In old and broken-down subjects, the victims of very chronic and sometimes never-ending gonorrhœal rheumatism, after one, several, or many of their joints have become ankylosed, the disease goes on and on, attacking the fibrous structures of muscles and bringing about their atrophy. In such cases also we may find persistent arthritis of the bones of the hands and feet, which results in permanent disfigurement and sometimes great deformity.

In some cases of chronic gonorrhœal rheumatism sciatica, mild or severe, may occur.

Diagnosis.—In many cases the existence of a gonorrhœa or the history of a comparatively recent attack will suggest the nature of the case under observation. In the main, the absence of sweating and the comparatively mild systemic reaction (in the majority of cases) will suggest gonorrhœa as the cause of the rheumatism. Then the predilection of the disease to attack the larger joints, particularly of the knee, ankle, wrist, and shoulder, and to invade only one, two, or three joints, is indicative of gonorrhœa as its cause. Hydrarthrosis is common in gonorrhœal rheumatism, and is infrequent and slight in the ordinary form of the disease. The absence of a history of rheumatism is also significant of urethral suppuration as a cause. The coincident involvement of tendinous sheaths, fasciæ, and bursæ, with perhaps the iris and conjunctiva, is a strong point against the case's being one of ordinary inflammatory rheumatism.

Inflammation of the Preputial Follicles.

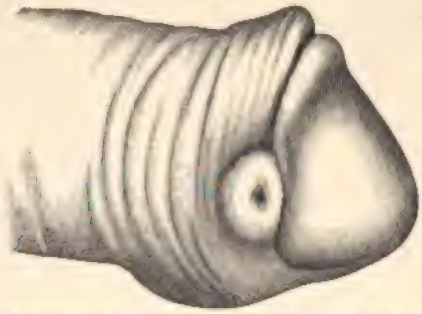
During the course of acute gonorrhœa or following such an attack we sometimes see running in the long axis of the penis, between the two layers of the prepuce, a little line of inflammatory tissue, the end of which is usually on the free border of the prepuce or just within its mucous layer. Careful inspection will usually show that this little line ends in a minute opening of the size of a pin's head or of a pinhole, but sometimes it may not be visible except by the use of a magnifying glass. Pressure on this little blind canal usually causes a small droplet of greenish or grayish pus to exude from it. This sinus-like lesion may be only about half an inch long, and it will rarely be seen longer than an inch.

This may be said to be the first form of gonorrhœal preputial folliculitis. There is, however, a second form, in all probability an intensification of the first form, in which we find a little cherry-stone-sized nodule or abscess-cavity situated between the two layers of the prepuce which has a well-marked outlet duct.

Usually there is but one follicular abscess; very rarely two are found. During the exacerbations of these chronic sinuses and abscess-cavities there is danger of auto-infection of the urethra. They may at these times also be the source of infection of women.

There is still a third form of preputial abscess. During an attack of gonorrhœa a small red spot is sometimes seen on either side of the frænum. This little red nodular spot soon becomes enlarged and elevated, of the size of a pea or larger, and at its apex a minute opening is soon

Fig. 26.



Follicular abscess of the prepuce near the frænum, due to gonorrhœa.

seen. An abscess of this kind may burst and seemingly heal up, or after the pus has been discharged and the inflammation has subsided it may be again infected by the urethral discharge, and again be the seat of abscess. This process may be repeated several times. In some cases, after the evacuation of the pus, usually by pressure or perhaps by

ment. If healing of the skin takes place, the blister must be applied again in the same vigorous manner. When blisters fail to cause the hydrarthrosis to subside, it may be necessary to draw off the contained fluid and to irrigate the joint with sublimate solution, 1 : 2000. Reaccumulation of the fluid demands a repetition of the process.

Over limited patches and areas of subacute or chronic nature strong tincture of iodine or pure ichthyol may be applied. In chronic cases, particularly those in which the joint-cavity is not involved, good results follow the liberal internal use of iodide of potassium. Indeed, in several cases in which there was absolutely no history of syphilis I have seen marked benefit follow the use of the mixed treatment in combination with strong mercurial inunctions and of mercurial fumigations. In two cases of gonorrhœal rheumatism of the bursæ in front of the tendo Achillis I produced a prompt cure by the injection of fifteen drops of a 5 per cent. watery solution of carbolic acid. This treatment may be used in all limited bursal and fascial inflammations due to gonorrhœa.

Paquelin's cautery, applied to limited spots, sometimes tends to promote resolution. In chronic cases massage is sometimes surprisingly beneficial. The prolonged systematic use of dry heat in high degrees is often of wonderful benefit in causing the absorption of the tissue-exudates into the joint-structures. In all chronic cases, where practicable, pressure to the extent of tolerance should be applied to the parts by means of elastic bandages, India-rubber adhesive plaster, or plaster-of-Paris splints. When suppuration and destruction or ankylosis of joints occur, the cases are to be treated on general surgical principles by withdrawing the fluid and irrigating the joint. Resection of the joint may be necessary when the cartilages have been eroded and the bones exposed.

PERITONITIS IN THE MALE.

Inflammation of the peritoneum of greater or less severity may result from the extension of the gonorrhœal process from some part of the seminal apparatus to that portion of the membrane in close contiguity with it.

Gonorrhœal peritonitis may be developed by acute inflammation of the seminal vesicles. The infectious process then begins in the recto-vesical cul-de-sac, where it may localize itself, or it may spread indefinitely from that morbid centre.

Gonorrhœal inflammation of the vas deferens or of a limited segment thereof may be the cause of peritonitis, owing to the fact that these anatomical structures are for a considerable distance in direct contact with each other.

Patients attacked by gonorrhœal peritonitis commonly complain of

colic at first, and soon direct attention to the tenderness in one of the iliac fossæ or of the groin. With the extension of the process the whole hypogastrium may become swollen and tender, and from that the whole abdominal cavity may be attacked. The symptoms are rapid and small pulse, increased respiration, and high fever. The pain is intense, particularly on pressure, and causes the patient to have a sallow, drawn, and anxious facies. There may be obstinate constipation, and exceptionally diarrhœa. In many cases vomiting, particularly of bile, has been observed. There is usually much distention of the abdomen. In this way the disease may run on and end in recovery, but a survey of the literature shows that in many instances death has ensued.

In many cases rectal exploration reveals marked, even intense, tenderness or pain in the prostate and seminal vesicles.

Treatment.—The patient must be put to bed as soon as the prodromal pains are felt. If he is of vigorous build, leeches may be applied over the painful part. Then hot poultices must be kept continuously over the abdomen. Opium should be given internally, and all symptoms treated according to their indications.

CARDIAC AFFECTIONS.

So many well-attested cases have been reported, particularly within the past ten years, in which cardiac lesions of varying degrees of severity have developed during the course of acute and chronic gonorrhœa that there is now no longer any doubt of their origin in this virulent infectious process. Cardiac complications of gonorrhœa, however, are very rare, since in all less than fifty cases have been reported. The male sex seems to be the one most liable to heart complications during gonorrhœa, for there are only two instances on record in which they occurred in women. In the majority of cases cardiac lesions are associated with or follow gonorrhœal rheumatism as complications of gonorrhœa.

The fibrous and serous structures of the heart are the parts primarily attacked, the endocardium most frequently, and the pericardium in a smaller percentage of cases.

In some cases the symptoms are comparatively mild, and recovery, though generally with impaired heart, may occur. In such cases the patients complain of a "stitch" in the left chest and palpitation of the heart, whose action is accelerated and increased. Sometimes a slight pericardial crepitant râle may be heard. In the mild endocardial form we find palpitations, the prolongation of the first sound, with roughness and frequency of the pulse. There may be præcardial dulness and distress, and *bruit de souffle* at the base with the first sound. Soft blowing murmurs are sometimes heard at the apex. It is thought the aortic valves are more commonly attacked than the mitral.

The possibility of the onset of cardiac trouble in patients suffering from gonorrhœa should be kept in mind by the surgeon, and if found, the patient should at once be put to bed and properly cared for.

Reported cases show that a very grave, even deadly, form of endocarditis is a very rare complication of gonorrhœa. In these cases, though the heart affection is a very prominent feature, the essential morbid condition is really pyemia.

This serious disorder is probably caused by the pyogenic microbes.

The **prognosis** in all these cases is grave.

The **treatment** must be based on the indications presented.

Pyæmia.

Besides the cases of endocarditis and pericarditis which have their origin in urethral suppuration, there are a number of cases of pyæmia, in some of which there were heart-complications, on record, in which the infection was derived from pus-foci near the urethra.

A study of the various published cases of pyæmia following gonorrhœa shows that some are mild in character and end in recovery, whilst others are of a malignant type and end in death.

AFFECTIONS OF THE SPINAL CORD.

Within a few years cases have been reported in which there was inherent evidence that certain spinal affections and symptoms had their origin in urethral gonorrhœa. In these cases dorsolumbar pain, girdle pain around the lower part of the chest, lightning pains in the lower limbs, extreme hyperæsthesia, motor paresis, exaggeration of the reflexes, aud epileptoid trepidation were observed. These symptoms, referable to disease of the cord and its meninges, recurred severely on these occasions coincidently with articular lesions and the recurrence of the gonorrhœal discharge. In a reported case in the second week of acute gonorrhœa the patient was attacked with pain in the region of the crural nerves, double hydrarthrosis, tarsal and tibio-tarsal arthritis, pains in the head, lightning pains, exaggeration of knee-jerks, epileptoid trepidation, tremor and spasm of the limb when the foot was placed on the ground, muscular weakness, and dorsolumbar pains, followed by muscular atrophy.

EXTERNAL URETHRITIS.

Under the title external urethritis we understand several varieties of chronic inflammation which have their origin in gonorrhœa, are seated in the follicles and crypts of the external surfaces of the penis, and are of very chronic and relapsing character.

Inflammation of the Preputial Follicles.

During the course of acute gonorrhœa or following such an attack we sometimes see running in the long axis of the penis, between the two layers of the prepuce, a little line of inflammatory tissue, the end of which is usually on the free border of the prepuce or just within its mucous layer. Careful inspection will usually show that this little line ends in a minute opening of the size of a pin's head or of a pinhole, but sometimes it may not be visible except by the use of a magnifying glass. Pressure on this little blind canal usually causes a small droplet of greenish or grayish pus to exude from it. This sinus-like lesion may be only about half an inch long, and it will rarely be seen longer than an inch.

This may be said to be the first form of gonorrhœal preputial folliculitis. There is, however, a second form, in all probability an intensification of the first form, in which we find a little cherry-stone-sized nodule or abscess-cavity situated between the two layers of the prepuce which has a well-marked outlet duct.

Usually there is but one follicular abscess; very rarely two are found. During the exacerbations of these chronic sinuses and abscess-cavities there is danger of auto-infection of the urethra. They may at these times also be the source of infection of women.

There is still a third form of preputial abscess. During an attack of gonorrhœa a small red spot is sometimes seen on either side of the frænum. This little red nodular spot soon becomes enlarged and elevated, of the size of a pea or larger, and at its apex a minute opening is soon

Fig. 26.

Follicular abscess of the prepuce near the frænum, due to gonorrhœa.

seen. An abscess of this kind may burst and seemingly heal up, or after the pus has been discharged and the inflammation has subsided it may be again infected by the urethral discharge, and again be the seat of abscess. This process may be repeated several times. In some cases, after the evacuation of the pus, usually by pressure or perhaps by

a slight incision, the morbid process ceases and the part again becomes healthy. In other cases, however, the abscess is very persistent and rebellious to treatment. In some cases the nodule grows larger and deeper, and perforation of the urethra may occur. (See Fig. 26.)

Persons having a long, tight, or a straight prepuce or one with a small orifice are the ones who suffer most from the chronicity and oft-time recurrence of these little lesions. Then, again, persons who for any reason suffer from balanitis or who are frequently the victims of gonorrhœa are peculiarly liable to these abscesses. It is not uncommon for one of these abscesses to become active, and for its pus to infect the urethra of its bearer, without any infection in coitus.

Suppuration of Follicles of the Cutaneous Investment of the Penis.

We sometimes see on the under surface of the penis, along the raphé even as far back as the scrotum, small suppurating sinuses and follicles that usually have a well-marked outlet which is directed forward toward the glans penis. Sometimes these lesions are tube-like, and again they feel like minute nodules. They may be seen in an active state, but usually they are shown to the surgeon when there is no complicating hyperæmia and only the slight discharge on pressure from the outlet duct. There is, as a rule, one such lesion, but sometimes there are two, rarely more.

The structures involved in these cases are undoubtedly sebaceous follicles, and they are usually associated with hair-follicles. Similar follicular inflammation may be found along the dorsum of the penis, on the middle line, as far as the symphysis pubis. One or more follicles may be involved.

Juxta-urethral Sinuses.

Not infrequently patients present themselves to the surgeon complaining of a slight but persistent discharge, which they say comes from one or both lips of the meatus. Sometimes the affected part is distinctly red, and again it may appear normal in tint. It sometimes happens that a distinct opening can be seen, and it is usually of the size of a pinhole. Very often this opening is hidden in the uneven papillary surface of the meatus, and the use of a magnifying glass is required to make it clearly visible. Usually pressure on the glans, particularly in the morning, will cause a droplet of pus to exude, and thus the outlet of the sinus is revealed. Then, again, in some cases a thin, minute crust forms from escaping pus, and removal of this crust reveals the hidden orifice. These sinuses are usually seated on one or both lips of the meatus at about a sixth or third of an inch from its inner margin. In most cases the sinus is seated in the middle of the lip of the meatus,

but in some cases it opens at the posterior, and quite rarely at the anterior, commissure. There may be one or two such sinuses on one side, which are entirely distinct from each other; then, again, cases are seen in which it is probable that the two sinuses are connected. These morbid canals usually run backward parallel with the urethra, but in some cases they pass obliquely backward and inward, and open in the fossa navicularis, forming meato-navicular fistulæ. It is not at all uncommon to find small follicular sinuses which open upon the urethra as far back as an inch from the meatus.

Fig. 27.

Juxta-urethral sinus during a period of exacerbation.

These little lesions may exist for years, giving issue to a slight discharge and causing no uneasiness of mind or body. In some cases we get a clear history of their onset during an attack of gonorrhœa; in others they seem to originate in balanitis. As a rule, they remain indolent for an indefinite time, but are liable to periods of exacerbation in which they become minute but conspicuous abscesses, as may be seen by inspection of Fig. 27. The introduction of a minute probe shows that these sinuses vary in length from one-third to one-half an inch, and, very exceptionally, a little longer.

These suppurating canals may be the cause of auto-infection, and in some cases they may secrete gonococci-containing pus by which the female may be contaminated.

Treatment.—In the treatment of the preputial follicular lesions the best course is thorough extirpation as soon as possible. If the surrounding tissues are in a state of hyperæmia, it is well by pressure or the use of the knife to let pus out, and then reduce inflammation by the use of antiseptic lotions. Usually there is such a redundance of tissue in the prepuce that thorough removal of the morbid parts is possible without any damage to the penis. In the fossæ of the frænum, however, these lesions are sometimes imbedded deep in the tissues and are adherent to the corpus spongiosum. In such cases the curette may often be freely used to advantage. It is well to remember that in some cases these lesions of the frænum are kept in an active state by balanitis, and that after circumcision the source of irritation ceases and the part soon gets well.

When there are two follicular abscesses, one on each side of the frænum, it will be necessary to dissect them out carefully, and perhaps at the same time remove that fibrous cord.

Suppurative follicles of the integument of the penis should be incised and thoroughly curetted.

The treatment of juxta-urethral sinuses is much more difficult. It is sometimes expedient to enlarge the sinus and then endeavor to obtain healing from the bottom by means of stimulating injections, and, if possible, a minute tampon. The ordinary hypodermic needle, blunted by the removal of its point, is very useful in the treatment of these cases. After careful cleansing and antisepsis a drop or two of a 3 or 4 per cent. nitrate-of-silver solution may be injected every second day. Good results have been obtained by the introduction of a fine probe coated with pure nitrate of silver which had previously been melted by heat.

PERI-URETHRAL ABSCESSES.

Abscesses of medium and large size are not infrequently found upon the penis near the frænum and along the course of the organ as far back as the peno-scrotal angle. It must be borne in mind that these lesions are of greater extent and severity than those described in the preceding section as follicular inflammations.

Peri-urethral phlegmon or abscess near the frænum is usually a concomitant of acute gonorrhœa or it may occur in the chronic stage of that process. In some cases, in primary attacks, it appears during the height of the urethral suppuration, in others toward the period of decline, and only exceptionally in the later stage. It usually begins as a red and tender spot on one side of the frænum. This inflammatory condition may increase rapidly, and again its growth may be rather slow. In either event it is soon seen that an abscess is in process of formation. These abscesses are in general round and globular, but their shape is determined by the topographical arrangement of the frænum and the tissues forming its fossæ and the prepuce. Sometimes the tumor is round, and again it may be oval shape. In Fig. 28 an oval abscess of the left frænal fossæ is well shown.

Perhaps in the majority of cases these abscesses occur unilaterally and are tolerably well circumscribed. When of goodly size the inflammatory œdema which accompanies the suppurative process may involve the tissues on the unaffected side of the penis. This is also well shown in Fig. 28.

Then, again, in somewhat exceptional cases an abscess forms in one frænal fossa, increases rapidly and extensively, and passing under the frænum, involves the other fossa in the suppurating process. This is well shown in Fig. 29, in which all the connective tissue at the under part of the glans is involved in abscess-formation. The frænum then divides the abscess into two lobes.

It also happens, somewhat rarely, that the tissues of each fossa of

the frænum become affected separately, in which event there are two distinct abscesses.

In any of these cases the patient experiences more or less pain at the part involved. In somewhat rare instances there is constitutional disturbance, as shown by chills, fever, and loss of appetite. The pressure of the tumor upon the urethra may affect the force and shape of the stream of urine or occasion dysuria amounting even to retention.

When incised and properly treated these abscesses heal up promptly. In some cases, however, particularly when proper care has not been

Fig. 28.

Abscess near the frænum, producing moderate paraphimosis.

Fig. 29.

Abscess near the frænum involving both fossæ.

taken, the abscess-cavity contracts down into a small inflammatory nodule which remains indefinitely. This inflammatory nodule sometimes redevelops into an abscess with each recurrent attack of gonorrhœa or balanitis.

Abscesses of the Follicles of the Urethra.

These lesions begin as inflammatory foci either in Littre's follicles or the crypts of Morgagni. During the acute and declining stages of gonorrhœa we frequently feel with the finger-tips one or more or many little millet-seed and even larger nodules in the corpus spongiosum. These little circumscribed swellings are undoubtedly swollen follicles. In most cases, for the reason that we find gonococci in the pus coincidently with the follicular inflammation, it is fair to assume that the morbid process is caused by those microbes. Follicular inflammation occurring after the cure of gonorrhœa—a not very frequent condition—

may be due to the action of other microbes, perhaps the streptococci or staphylococci. It may be stated quite positively that in most of the cases of gonorrhœic follicular inflammation resolution takes place synchronously with the cessation of the major process.

Follicular abscesses of the urethra may develop in the fossa navicularis. These suppurations are here, as a rule, not of large extent, the abscess being usually of the size of a pea. The smallness of the follicular abscess in this region is probably due to the density of the tissues and to the absence of much connective tissue. Usually, when the process is complete, pus is discharged into the urethra, and a short sinus

Fig. 30.

Abscess of the follicles of the urethra.

leading to a small cavity is left. This may heal of itself or may require local treatment. In somewhat rare cases the abscess of the fossa navicularis extends deeply into the tissues and opens on the outside in either fossa of the frænum. (See Fig. 30.) In this event there is much danger of a permanent urethral fistula. Careful treatment, aided by nature, or nature alone may close the wound, but there is always a strong probability that the fistula will be permanent. A plastic operation is sometimes of benefit in these cases.

Farther down the urethral canal follicular abscesses are not at all uncommon. They begin as small, round, painful swellings, which in their early stage are easily circumscribed by the fingers. They usually go on more or less promptly to suppuration, which is attended by much inflammatory œdema of the corpus spongiosum and the connective tissue external to it. (See Fig. 31.)

The tendency to relapse observed in these follicular urethral lesions is shown in Fig. 32, in which a large swelling (the tenth of a series) of the middle of the under part of the penis is portrayed. As is common in these relapsing phlegmons, the inflammatory process was not very acute, though there was considerable suppuration.

In most of these cases of follicular suppuration of the urethra the

swelling is out of all proportion to the amount of suppuration. There is usually very much inflammatory œdema, but the suppurating cavity

FIG. 31.

Large abscess of the follicles of the urethra during gonorrhœa.

usually contains from half a drachm to a drachm of pus. In very large phlegmons two or three drachms may be found.

FIG. 32.

Abscess of the follicles of the urethra (tenth attack).

There are two dangers to be looked for in these cases of follicular abscess of the urethra. The one is urethral fistula; the other is the formation, after the abscess bursts into the urethra, of an inflammatory nodule. This inflammatory nodule is always a menace to the patient. It resolves itself into a little lump, in most cases easily felt, usually on the lower wall of the urethra. In its relaxed condition occasionally it may be so small and insignificant that it can be scarcely felt, but during erection its presence is readily made out. It may thus remain for months or years; but, as a rule, with every recurrence of gonorrhœa the suppurative process lights up again and a new abscess is formed. This may occur again and again for many years. In some cases the abscess-formation becomes more intense, and pus is discharged externally

through the inflamed and eroded skin. In these obstinate cases a urethral fistula remains, which is usually permanent and requires for its relief a plastic operation. In favorable cases the inflammatory nodule undergoes contraction, and finally ends in a small cicatrix.

In many of these cases of follicular phlegmon of the urethra the morbid process is limited to the urethral wall proper, and it is in these cases, even when suppuration occurs, that resolution and cure commonly result. In the more severe cases the follicular abscess increases beyond the urethral tissue proper into the connective tissue between it and the corpus spongiosum. It may continue still farther and involve more or less or all of the corpus spongiosum. As the suppurative process thus progresses outwardly, in most cases a wise provision of nature occurs. With the establishment of the suppurative process in the deep part of the urethral wall, or in the contiguous connective tissue, or in this and in the corpus spongiosum, an adhesive inflammation obliterates the little follicular cavity in the urethral wall, the damage is repaired, and the then outlying abscess is shut off from all communication with the urethra. This abscess then has as its base the healed urethral wall, while its sides and roof are formed by the infected tissues of the corpus spongiosum, the subcutaneous connective tissue, and the skin itself.

It may happen, unfortunately, that this walling off of the abscess-cavity by adhesive inflammation does not occur, and then there is much reason for apprehension that a permanent fistula will follow the resolution of the inflammatory process. Even should urine escape in these cases, all hope need not be given up, since sometimes, most unexpectedly, healing takes place, the urethra is not left perforated, and we find at the seat of the trouble a little line or nodule of firm structure which we know is the cicatrix. When, however, the parts are well healed and a sinus remains, it may usually be looked upon as permanent, unless relieved by a plastic operation.

There is still another condition which is sometimes observed. The abscess opens into the urethra, and there is left a cavity and an internal blind fistula or sinus leading to it. In favorable cases the parts retract until the lesion ends in a little cicatricial mass; but sometimes this happy result is not attained, and the cavity and its duct remain. Then urine leaks into the wound, and slowly or quickly an abscess again forms. This may occur again and again, and may finally end in a fistula leading from the urethra to the outside. Then, again, even when abscesses have repeated themselves under these conditions many times, thorough healing may finally occur.

Abscess of Cowper's Glands.

Cowper's glands which are seated between the two layers of the triangular ligament may be the seat of abscess due to gonorrhœa. They

usually occur at about the same period as epididymitis, during the third or fourth week of gonorrhœa or later. Usually but one gland is affected, quite exceptionally both are involved, and in this they are similar to abscess of Bartholin's gland. The peculiarity of these abscesses is that they are seated on either side of the raphé or median line. In their early stages these phlegmons are felt as little cherry-sized round or oval swellings just at the triangular ligament. With the development of the abscess-process the patient experiences pain, uneasiness, and tension in the perineum near the bulb, which is aggravated in

Fig. 33.

Abscess of Cowper's gland.

the sitting position, in walking, and by pressure and friction of the clothes. With the increase in the phlegmonous process the pain becomes severe, and in many cases there are chills, fever, and malaise. Owing to the swelling, the urethra is not unfrequently pressed upon, and dysuria, and even retention, may result. As the abscess increases in size it pushes outward and forms a tense red swelling in the perineum, or it pushes forward and juts out at the penoscrotal angle. While at first the swelling is seated on one side of the raphé, when it

becomes very extensive it encroaches on the opposite side. When the abscess is very large, as it sometimes is, the whole perineum becomes red and swollen. (Fig. 33.)

In most cases abscess of Cowper's glands is an acute process, but in some it takes place quite slowly. Usually the swelling extends from the bulb into the tissue beyond, and the abscess either opens or is opened in the perineum or in the scrotum. The further course of these abscesses is similar to that of those just described. The abscess may be walled off, and then when opened may be healed from the bottom, or the sinus leading into the urethra may remain patulous, in which case there is left a perineal or scrotal fistula. In the majority of cases the urethral lesion, which consists of the duct of the gland in a state of inflammation, heals, and no bad results are finally left. In rather exceptional cases a fistula results.

It sometimes happens, particularly when the abscess is not very large, that it opens through the duct into the bulb, and the pus then escapes through the urethra. In this event it may happen that subsequent contraction may obliterate the abscess-cavity and its duct. Then, again, it is rather more common to find that considerable contraction occurs—that the morbid process becomes circumscribed to a nutmeg-sized or even larger mass, and this may remain indolent. This condition is always one of ill omen, since it so frequently forms a focus for the re-formation of abscesses. Thus one phlegmon after another may form and burst into the urethra over a period of many years. Sometimes this recurrence of the phlegmonous process is lighted up by fresh attacks of gonorrhœa or by exacerbations of a chronic gonorrhœal process. Then, again, in many instances the new suppuration is seemingly due to the leakage of urine into the inflamed nodule.

Quite rarely still another course may be taken by the Cowper's-gland abscess. In the original inflammation there may be considerable œdematous hyperplasia of the gland and tissues immediately surrounding it, and some pus may be formed, but the whole abscess-swelling is of a subacute character, and less in size than a walnut. After the escape of the pus a nodule is left, which for a time may or may not remain quiescent. Then it gradually grows, and a firm somewhat painful swelling, without much redness, appears in the perineum. This swelling, which is for a long time on one side of the raphé, increases very slowly, occupying two and even many months in its course. It presents a hard, firm structure, and fluctuation cannot be detected for a long time. Finally, the necessity for opening the abscess becomes evident, pus escapes, and usually a fistula leading to the bulbous urethra is left. But even in these cold chronic abscesses the walling off of the suppurative process may occur and no fistula may be left.

Treatment.—Until the suppurative process is ripe it is well to apply lead-and-opium wash, or muriate of ammonia, or carbolic solutions. When fluctuation is felt, a liberal but careful incision should be made over the prominence of the swelling and the abscess-cavity should be irrigated with bichloride solution 1 : 2000. Then the wound should be dusted with iodoform or aristol and packed with sterilized gauze. In the somewhat rare event of a fistula being left it may be necessary to perform a plastic operation.

GONORRHŒAL OPHTHALMIA.

Gonorrhœal ophthalmia is happily a rare accident rather than a complication of gonorrhœa. It is a violent and often destructive inflammation, and more intense than purulent conjunctivitis. It is developed in the eyes of young infants during delivery, from gonorrhœal pus in its mother's vagina. The usual mode of infection in adults is the transference of the pus from the genitals to the eyes by means of the fingers. In some cases the pus of the infected eye is carried to the other by the fingers during sleep or by accident during the day. Towels and linen are also said to be the vehicles of infection.

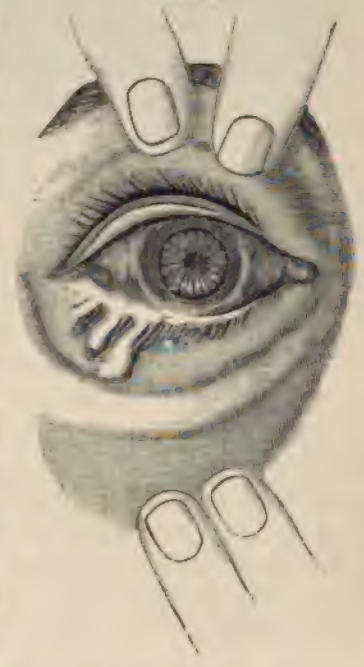
The virulent form of ophthalmia has been shown to be caused by pus containing gonococci. A less virulent form is said to be due to pus not containing gonococci, but other pyogenic microbes. In the majority of cases of the milder affection the symptom-complex is much less severe than in gonorrhœal ophthalmia, but in some cases the severity is seemingly just as great. All forms of chronic urethral and vaginal pus should be regarded as dangerous.

This form of ophthalmia is said to be more common in men than in women, for the reason, probably, that gonorrhœa is so much more frequent in the former than in the latter. It may occur in the acute stage of gonorrhœa, but it is generally seen during the declining stage. It may be confined to one eye or may later on attack the other one.

Symptoms.—The first symptoms, which usually begin in a few hours or as late as thirty hours after infection, are hyperæmia of the conjunctiva, an itching sensation at the margin of the lids, as if caused by a foreign body, soon followed by increased lachrymation, a gumming of the ciliæ together, and collection of little masses of mucus at the inner canthus. The watery secretion soon becomes mucoid and very shortly purulent. A conjunctivitis, mild at first and limited to the lids, but later on of a severe type involving the ocular mucous membrane, which is elevated above the sclerotic coat, is then seen. All of the conjunctival surface is then of a very deep-red color, much swollen, producing eversion of the lids, and roughened from distention of the papillæ. The intense chemosis of the conjunctiva bulbi is well shown in Fig. 34, in

which the red, swollen, and infiltrated membrane surrounds the cornea like a pad. At this time the secretion is purulent and profuse, and redness and œdema of the integument of the lids are present.

Fig. 34.



The amount of pain occasioned by this disease varies in different cases. During the development and acme of the inflammation it is generally severe. It is described by the patient as a sensation of burning heat and tension in the eyeball, radiating to the brow and the temple. The system at large sympathizes with the local disease. For a time there may be general febrile excitement, but symptoms of depression may soon appear; the pulse becomes rapid and irritable, the skin cold and clammy, and the patient anxious and nervous. Notwithstanding the severity of the symptoms, resolution is still possible. Under proper care and treatment the inflammatory action may abate and the tissues recover their normal condition, leaving the eye as sound as before the attack. So fortunate a result is more to be hoped for than confidently anticipated.

Prognosis.—The prognosis is always grave, especially so when both eyes are attacked. If treatment is instituted at an early period, the chances of the patient are best. If ulceration of the cornea has taken place, they are bad. Sometimes the whole cornea is extruded and the contents of the eye escape. An eye has been known to be thus destroyed within twenty-four hours, and even in a single night.

According to the extent and situation of the ulceration the eye is more or less permanently injured. When superficial and marginal, the resulting opacity of the cornea may not interfere with the sight, which may be impaired if the leucoma is central. Perforation of the anterior chamber and prolapse of the iris, when partial, may also be remedied by art; but when the whole or the larger part of the cornea has sloughed away, and the prolapsed iris has become covered with a dense layer of fibrin, forming an extensive staphyloma, the case is hopeless. In general, when less virulent micro-organisms are found, the prognosis is not grave. The earlier a case of gonorrhœal ophthalmia is seen and proper treatment is commenced, the better is the prognosis. In infants the

prognosis largely depends on the care which the case receives. In early adult life there is such resistance of the tissues that with care the inflammation may be controlled. Toward middle age and in elderly subjects the tissue-resistance is not as great, and the prognosis then is more serious.

Diagnosis.—So much do severe cases of purulent ophthalmia resemble those of the gonorrhœal form that a sharp diagnosis is often impossible, owing to the meagreness of the history. Any intense form of ophthalmia, whatever may be its origin, must be looked upon in as serious a light as that due to gonorrhœa. In all cases the pus should be examined microscopically at once, and if the gonococcus is found it is absolutely certain that the case is of gonorrhœal origin, and therefore a very grave one.

Treatment.—The first indication in treatment is to procure two nurses—one for the day, the other for the night—who shall be in constant attendance. They should, at the outset, be thoroughly impressed with the gravity of the case, instructed as to their duties, and shown the technic of opening the eye and removing the pus. They must be warned of the intense infectiousness of the secretions, must be directed to keep their hands and nails in a thoroughly aseptic condition, and they should provide themselves with a pair of large protective concave spectacles. In case one eye only is affected, the other may be covered by Buller's shield. Or the sound eye may be covered with cotton wool strapped down with adhesive plaster, over which a solution of gutta-percha is painted. In young subjects it is well to secure the hands.

If seen before inflammation has fully developed, four to six leeches may be applied at the external canthus or to the mucous membrane of the corresponding nostril, or if not at hand cups may be used on the temples. The character of the inflammation being manifest, a careful, continuous, and energetic treatment must be followed. Constant application of cold is then absolutely required. This is accomplished by means of small pieces of linen *of a single thickness*, which, when thoroughly chilled upon a piece of ice, should be laid over the eye, and replaced by another every two or three minutes in very intense cases. These pieces of linen should be burned immediately after use. The further treatment of the case should be as follows, after the manner proposed by my friend, Dr. J. A. Andrews: When the inflammation is fully established, the indications are to wash away the pus in the most perfect manner as soon as possible, and to render the conjunctival surface aseptic. For this purpose a saturated solution of boracic acid is necessary. A bichloride solution, 1 : 10,000 or 20,000, may also be used. This may be used by means of Andrews' irrigator No. 2, or by means of a piece of fine rubber tubing attached to a fountain syringe,

and allowed to flow with the utmost gentleness. These irrigations must be repeated as often as necessary. Then, from the beginning of the disease, a 2 per cent. solution of nitrate of silver should be dropped, rather than brushed, into the eye by the surgeon, since it is then distributed by the movement of the eyelids. When there is considerable discharge and the conjunctiva is much swollen, the silver solution should be used once daily, but it should not be repeated so long as the action already produced by one application is present. Great care should be taken that the silver is not applied to the cornea. Should the latter become involved we may resort to atropine. Instillations of a four-grains-to-the-ounce-of-water solution of atropine may be used also at intervals during the severity of the attack. As improvement takes place, the use of the solution of nitrate of silver should be more infrequent until it is finally dropped.

If chemosis has taken place, the ocular conjunctiva and subjacent connective tissue should be divided by means of blunt scissors, and in case the eversion of the lids is not complete, the outer commissure should be freely divided, together with the canthal ligament, for the inflamed surfaces must be in such a condition that they can be thoroughly treated. Excessive œdema of the lids interfering with the opening of the eye may be relieved by minute punctures of the skin. After the subsidence of the acute symptoms the nitrate-of-silver solution, which toward the end has been used much less frequently than at first, may be replaced by a solution of sulphate of zinc.

The granular condition of the conjunctiva should be treated by the application of a piece of sulphate of copper to the surface every second or third day.

Patients suffering from gonorrhœal ophthalmia should occupy a large, well-ventilated room, which should be moderately, not wholly, darkened, and they should be placed exclusively in the care of the surgeon and nurses. At the onset of the disease a brisk aperient, even a cathartic, may be given, which should be repeated as necessary, care being taken that the patient's strength is not impaired by it. A mild diet, gruels and light broths, may be taken. Should evidences of malnutrition and debility appear, with weak and irritable pulse, more nutritious food of the most digestible character must be given, together with tonics, and perhaps ale, porter, milk-punch, etc. It must be remembered that the vitality of the corneal tissue is very low, and that its destruction may be hastened by an impoverished state of the system.

Serovascular Conjunctivitis.

This is a rare form of purulent conjunctivitis of which little has been written. This form of ophthalmia is really a complication of

gonorrhœa, and not one of its accidents. Though the pathogenesis of this affection has not been studied, much less made out, I think, reasoning by analogy, that it will later on be settled that it is an infectious process due to septic absorption, like gonorrhœal rheumatism, etc. It certainly is not due to pus-contamination.

This affection begins in a painless and insidious manner, but its objective symptoms are well marked. The patient at first feels a slight heat in the eye and a sensation as if some particle had lodged on it. Then the conjunctiva bulbi becomes rather swollen and hyperæmic. This is followed by hyperæmia of the conjunctiva of the lids. The secretion is at first serous and moderately copious, but in a few days it becomes slightly purulent. In the acme of the inflammation we find the whole conjunctiva rather swollen, with perhaps some œdema of the eyelids. The mucous membrane is of a quite deep-red color and of velvety appearance. The œdema is not usually very extensive. The affection runs an indolent course, and usually does not cause much pain or annoyance. One or both eyes may be affected. After cure a relapse is not uncommon. I have seen several cases in which patients were thus affected with each attack of gonorrhœa.

The **prognosis** is almost invariably good.

Treatment.—The eye should be irrigated with saturated boric-acid solution, and a few drops of a 2 per cent. solution of nitrate of silver may be dropped in the eye once or twice a day. Ice-cloths may be necessary.

CHAPTER IX.

GONORRHŒA IN THE FEMALE.

In many cases of gonorrhœa in women the history of the period of invasion is very obscure. In some the sudden onset of the affection in a previously healthy woman, in a woman recently married, or in a woman having had but a single intercourse may give positive clues as to the early stage of the disease. In very many cases, however, the patient gives the history of having suffered for a long period with chronic leucorrhœa, and of having experienced an exacerbation, and then examination reveals acute inflammation of the external and perhaps internal genitalia.

GONORRHŒA OF THE URETHRA.

Gonorrhœa of the urethral canal is the most common form observed in women. Formerly gonorrhœa of the vagina ranked first in importance and frequency, but recent observations and studies have conclusively proved that the virulent suppuration caused by the gonococcus is most frequently found in the urethra. The disease may be limited to the urethra, and it may exist at the same time with gonorrhœa of the os uteri. In some cases there is a coexistent vulvitis, and, particularly in young subjects, the vagina may also be involved, either as a whole or in part.

Urethral gonorrhœa in the female resembles in some particulars the same form in the male. It has a period of incubation, as shown by experimental inoculations both with virulent pus and the cultivated gonococcus, of about two days, which may be protracted to five days.

As a rule, the invasion of the urethra in the female is much the same as in the male. There is the slight tickling and burning sensation, and the same seromucous secretion in which little whitish particles may be seen suspended, which under the microscope are shown to be epithelial cells and gonococci. Then, after a prodromal period of a few hours or a day or two, the acute stage develops, with more or less severe burning in the urethra, rendered worse on urination, which soon becomes quite frequent. Examination of the parts shows the urethral orifice to be very red and swollen, with perhaps a pouting prominence of its lips. A greenish-yellow discharge escapes in considerable quantity, and may

cause redness and swelling of the parts around and beneath. The presence of the finger-tip inserted in the vagina shows that the urethra is swollen and tender, and pressure from behind forward causes pus to exude from the meatus. The urethra being such a short, nearly straight tube, ending directly in the bladder, that viscus may be early involved in the inflammation. Examination of the urine by the two-glass test will always show how deeply the morbid process has travelled. If the first specimen is cloudy and the second clear, it is certain that the bladder is not involved. If the second specimen is turbid, then it is certain that the bladder has been infected.

In some cases of acute urethral gonorrhœa in women there may be mild febrile movement and malaise. As a rule their local sufferings are quite acute at this time, and they usually become worse when the bladder is involved. Then in bad cases there is constant tenesmus, and as a result the frequent urinations cause great agony; not infrequently the patient's sufferings are increased by the urine scalding the inflamed contiguous parts.

In the majority of cases of the acute stage of urethral gonorrhœa in the female, amelioration of the symptoms begins in about a week or ten days, and even sooner. The burning and scalding become less and less severe, the tenesmus is less imperative, and the urinations become less frequent and painful. The redness and swelling of the meatus subside slowly, and the pus becomes whitish and mucoid. In this way matters grow progressively better until the chronic stage may be reached. Then we commonly see a normal or only slightly red meatus, from which, by intravaginal pressure on the urethra, a drop or two of viscid mucopus or a thinner milky-looking fluid may escape. In this condition the woman may suffer no discomfort whatever, or she may have a very slight smarting or a sensation of heat on urination.

Microscopical examination of the pus in the florid stage shows pus-cells with many gonococci. As the secretion becomes more mucoid, epithelial cells show prominently in the field, with a diminished number of gonococci. In the chronic stage there are usually found some pus-cells, epithelial cells, a few gonococci, and the usual indifferent microbes. Later on no gonococci can be seen. In this chronic stage, when the bladder has remained intact, the first ounce of water passed into the first vessel will contain some clumps and filaments of pus and epithelium, while the urine in the second vessel will be clear. When there is a complicating cystitis the urine in the second glass will be nearly as turbid as that in the first glass.

Many women have this chronic form of urethral inflammation for a long time, even for years. Its secretion in the early months is infectious. Later on the process is simply a post-gonorrhœal urethritis, and the pus

then is harmless. As a rule, the urethral secretion becomes innocuous in about six months or a year after the date of infection, as I have myself many times seen. This is shown by the impunity with which men cohabit with women who have this emasculated secretion. In its active stages, however, the pus of gonorrhœal urethritis of women is equally as virulent as that of men similarly afflicted.

In the declining and chronic stage of urethral gonorrhœa, in the absence of symptoms and of swelling and redness of the urethral orifice, the way to diagnosticate the trouble is by intravaginal pressure on the urethra from behind forward, or by the examination of the urine, which is passed several hours after a previous urination which has cleansed the canal. Women very frequently urinate just before presenting themselves to the surgeon, who then fails to obtain a secretion in the meatus by pressure on the urethra. The woman under suspicion should not be allowed to urinate or use injections on the same day that she applies for examination, and the surgeon should decline to give an opinion if she does.

In chronic urethritis in women it is not common to see the exacerbations of the trouble which are so frequent in men. In the majority of cases the intra-urethral and peri-urethral glands only beome infected in the declining stage of the urethritis. Therefore these forms of inflammation will be considered farther on separately. Since there are no mucous follicles along the course of the female urethra beyond the first half inch, as there are in man, we do not, as a rule, find those deep-seated follicular abscesses which are almost peculiar to men.

GONORRHŒA OF THE OS UTERI AND UTERUS.

The chief importance of gonorrhœa of the os uteri resides in the fact that from this focus the uterus itself and the parts above in direct anatomical connection may be invaded early or late by the infection.

Gonorrhœa of the os uteri is very probably contracted in intercourse with men who are in the declining stage of acute gonorrhœa. During the acute stage men, by reason of the pain, swelling, and discharge, refrain from coitus, but as the trouble subsides they often weary of continence, have intercourse, and infect their consorts.

The anatomical position of the os is such that in coitus it generally comes in contact with the apex of the glans penis, and there becomes bathed with the ejaculation which carries with it pus from the still inflamed urethra, unless the latter tube has been thoroughly flushed by recent urination. When the vagina is short, and when the uterus rests low in the pelvis, the chances of infection are great. Consequently, when the uterus is placed high up the os may escape infection. The

length of the penis and the duration of the sexual act also have bearing upon the infection of the os.

Gonorrhœa of the os uteri may be the sole evidence of a given infection, which may begin in this part, and there remain until cured. It also coexists in many cases with a urethritis of similar origin. Then, again, the pus escaping from the uterine orifice not infrequently infects the vagina, usually in a localized manner, and rarely in the totality of the tube. In only acute and very severe cases is the os infected by extension of the disease from the urethra up the vagina.

In the majority of cases gonorrhœa of the os uteri begins in an insidious manner unattended with marked symptoms. The external and internal surfaces of the os become red and swollen, and they give forth a mucopurulent secretion. Some women will complain of excessive discharge; while others, who have long had vaginal secretions, may pay no attention to an increase, even if it is decidedly copious. Thus it is that this affection is seldom seen in its very early days.

When a woman suffering from gonorrhœa of the os uteri is examined by means of the speculum, nothing absolutely characteristic or diagnostic can be seen. The os is swollen, and is more or less red, even to a purplish tint. At first the mucous membrane is swollen and has a velvety appearance. From the os a purulent or mucopurulent discharge escapes in large drops, and around the os is a narrow collarette of redness and erosion. Then, when the os is much enlarged, it may be eroded in totality or in part. Sometimes there are many small erosions, and again there may be several quite large ones. Though these erosions are sometimes called ulcerations, they are simply local losses of epithelium, such as we see in tolerably well-marked cases of erosive balanitis. When the inflammatory process runs higher and there is much exudative inflammation, the outer surface of the os presents a mammillated appearance, probably from the swelling and prominence of the muciparous glands. This condition may become so well marked that the appearances of the os resemble those of a very rough orange. Then, again, the surface of the os, in very severe cases, may become quite deeply eroded and present, as pointed out by Rollet, the appearance of a deep-red cherry whose skin has been peeled off. With a still greater increase in the morbid process granulations, perhaps a few and perhaps in abundance, may develop on the external surface of the uterine neck and on the contiguous mucous membrane, particularly that part below the posterior lip of the os uteri. These granulations may be of millet-seed size, and they may resemble the papillæ of raspberries and strawberries. In the course of time these granulations may go on and develop into true warty growths, which may later on become epitheliomatous. Over the morbid surface we fre-

quently find a film or membrane of thick greenish pus, and from the os a purulent fluid escapes. In many of these cases, when fully developed, the patients complain of dysmenorrhœa and too frequent and too copious menstruation. It is these menstrual symptoms which often cause the patients to seek medical advice, and then a correct diagnosis may be made.

In a goodly number of cases the tissue-changes on the external surface of the os are very slight, consisting of a mild increase of redness, with or without moderate erosion.

Even when there is a marked condition of erosion the external epithelium may be restored, while at the same time the morbid process persists in the lumen of the os. The main cause of the chronicity of gonorrhœa of the uterine neck is the localization of the process in the numerous and deeply seated glands of Naboth, with their plentiful blood-supply. As the affection grows old, even if little or indifferent treatment is followed, the discharge in many cases becomes less purulent and more mucoid, so that in its chronic stage this form of gonorrhœa may only give as an objective symptom the well-known glassy-white mucous plug which hangs from the os so constantly. This plug resembles those of the ordinary simple inflammations of these parts; and, while it frequently contains gonococci in its meshes, there is no visible sign present to denote its virulent character. In many cases the only means of determining the presence of gonococci in the os is to curette it gently, and then examine the detritus microscopically.

Throughout the whole course of gonorrhœa of the os this segment may not be the seat of pain, and its examination by bimanual manipulation may give rise to little if any unpleasant sensation. Pain, however, is quite exceptionally felt, either spontaneously or as a result of physical examination.

Now, it must be confessed that, with all the objective phenomena just presented, there are no appearances which may not be found in simple affections of the uterine neck. How, then, can we establish a diagnosis of gonorrhœa? In some cases the facts of an infecting coitus may be established. In others (when the trouble is clearly recognized) the onset of an endocervicitis in a healthy young woman, who has not been tampered with to produce abortion, who has not undergone any form of minor gynecological treatment, and who has not had any disturbance of menstruation, may cause the suspicion of gonorrhœal infection in coitus. In many cases, early in their course it is very easy to find the gonococcus in the pus, which must be taken by means of a platinum loop from within the cervical cavity, the orifice of which has been rendered clean and sterile. Then, again, we frequently meet with cases in which a profuse, very yellow, purulent discharge escapes from the os, in which

gonorrhœa, and not one of its accidents. Though the pathogenesis of this affection has not been studied, much less made out, I think, reasoning by analogy, that it will later on be settled that it is an infectious process due to septic absorption, like gonorrhœal rheumatism, etc. It certainly is not due to pus-contamination.

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cause redness and swelling of the parts around and beneath. The presence of the finger-tip inserted in the vagina shows that the urethra is swollen and tender, and pressure from behind forward causes pus to exude from the meatus. The urethra being such a short, nearly straight tube, ending directly in the bladder, that viscus may be early involved in the inflammation. Examination of the urine by the two-glass test will always show how deeply the morbid process has travelled. If the first specimen is cloudy and the second clear, it is certain that the bladder is not involved. If the second specimen is turbid, then it is certain that the bladder has been infected.

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Gonorrhœa of the vagina, therefore, may be caused by the extension upward of the infection from the vulva, and it may also result from infection by virulent pus from the cervix uteri. True gonorrhœa, limited to the vagina proper, may be seen rather exceptionally in quite young women.

GONORRHŒA OF THE VULVA.

Gonorrhœa may originate primarily in the vulva, or it may be caused by contact with gonorrhœal pus from the vagina and parts above. As a primary affection it is not very common, and is usually seen in girls of from fifteen to twenty years of age as a result of rape or coitus which is difficult of accomplishment, owing to the then compact and unstretched condition of the parts. It is this natural impediment to intromission which causes the external infection by the gonorrhœal pus from men.

Gonorrhœa of the vulva begins with a sensation of itching, soon followed by intense burning. At first the secretion is mucoid and in excess of the normal fluid of the parts; it then becomes mucopurulent, and finally of a glairy, purulent character. Examination usually shows, particularly in hospitals and dispensaries, and often in private practice, matting of the hairs on the mons Veneris and of the hairs on the labia majora in the form of little tufts. Upon separation the greater and lesser labia are seen to be very red, much swollen, with more or less superficially eroded areas, and in the reflections of the mucous membrane. The whole surface is bathed with a creamy pus, which stains and stiffens the drawers and back portion of the chemise in spots. Perhaps there may be erythematous or even eczematous patches on the upper and inner coapted surfaces of the thighs, from the irritation of the discharge which has flowed over them, and which may even severely irritate the anus. In uncleanly subjects the retention and decomposition of the discharge give rise to a characteristic nauseating and disgusting odor. When the inflamed surfaces have been carefully bathed, numerous minute follicular elevations, many perhaps superficially eroded, may be seen, mostly on the labia minora, but also on the labia majora. Unless appropriate treatment is instituted, the swelling becomes very great, the eroded surfaces become larger and coalesce, and in consequence of the swollen condition examination of the urethra and vulva is very difficult and painful. In cases of long labia minora the swelling is sometimes so great, and the constriction offered by the labia majora is so firm, that strangulation seems imminent. This condition has been considered by some authors as analogous to paraphimosis in the male, while others think that acute vulvitis is the analogue of balanitis and balanoposthitis. The inflammatory process may be thus intense, and yet limited to the

vulva; and, although the urethral and vaginal orifices are red and inflamed, these canals may yet remain unaffected. Thus it is that urination is excruciatingly painful, particularly when the urine runs over the vestibule, vaginal orifice, and fourchette, and that digital or instrumental examination is rendered impossible.

Taking all its features into consideration, gonorrhœa of the vulva of the severe form is a distressingly painful affection. Its heat, attendant itching, and burning give rise to erotic desires, even to nymphomania, while handling or manipulation of the parts or sexual intercourse is utterly impossible. Not uncommonly, the irritation of the anal orifice by the escaping discharge gives rise to tenesmus, diarrhœa, and even incontinence of the rectum. Such patients are frequently forced to assume the recumbent position, since sitting and walking are attended by increased pain. Occasionally malaise with mild fever is noticed.

Arising as it does from aborted and perhaps violent attempts at coitus in rape, in mediate contagion from gonorrhœal pus, the date of the onset of vulvar gonorrhœa is very often clearly marked. The evolution of the affection is rapid, and but one or two days may elapse from the time of the commencement of the premonitory pruritic burning sensation to its full development. The course is entirely dependent upon the efficiency and vigor of treatment. In dispensary practice it is often very difficult to make these girls give themselves proper care. Hence this affection in the lower classes often runs on into a chronic condition. In many of these cases the inflammation settles itself in the cleft between the large and small labia and around the introitus vaginæ. In private practice patients are more attentive to treatment, and then the severity of the trouble subsides in about a week or ten days. Becoming subacute, it then may rapidly subside and disappear.

In acute gonorrhœa of the vulva there is frequently invasion of the urethra, and in some cases the infection extends into the vagina. Not uncommonly Bartholin's glands are attacked, and rather less frequently Skene's glands and the peri-urethral glands may become implicated. These complications naturally prolong the course of the inflammation.

There is a chronic form of vulvitis, which consists in an inflammation of the sebaceous and mucous follicles, which may or may not be of gonorrhœal origin. Examination of the parts shows a large or small number of minute red follicular elevations seated on the inner surface of the labia majora and minora.

Inflammation of Skene's Urethral Glands.

Skene's glands, which open a little within the orifice of the urethra, may be the seat of a mild form of inflammation which causes the patient

very little discomfort. The orifices are seen to be enlarged, and around them is a thin rim of redness. A more severe condition is sometimes seen in which there is active inflammation of the ducts and the surrounding tissues, and the escape of a purulent fluid. In this condition the meatus is so swollen that it is somewhat prolapsed and everted, and thus it happens that the orifices of the ducts are rendered visible and look like little yellowish-gray ulcers seated on a deep-red papillomatous base.

Inflammation of Vestibulovaginal Glands.

Gonorrhœal inflammation may also attack two goodly sized glands, known to-day as the vestibulovaginal bulbs, the orifices of which open on each side of the meatus, and perhaps a little distance from it, but on its lower border near the vagina. This affection rapidly passes from the acute to the chronic stage, in which it may linger for long periods. On examination we find a red elevation, which may be covered with pus or from which a little pus may exude on pressure. This lesion may escape detection unless very scrutinizing search is made for it. Women frequently, before coming to the surgeon, wash the parts or in urination the secretion is carried away. When by careful pressure the orifice of the gland is detected, the passage of a fine probe to the depth of half an inch or more will show the source from which the suppuration comes. It can readily be understood that such a chronic lesion might be a persistent source of infection in men, since it is not uncommon for it to undergo exacerbations.

These glands may rather rarely become the seat of abscess.

Gonorrhœal Folliculitis.

Around the urethra for the distance of a third or half an inch a number of small follicles open by means of very minute ducts. These follicles may become inflamed during acute or chronic gonorrhœa and in women with simple vaginal discharges. These little foci of inflammation, of which there may be as few as two and as many as ten, are very apt to escape observation, for the reason that they do not present a striking appearance. They simply look like inflamed pinhead-sized elevations, on which perhaps there may be a small pus-crust. They cause the patient very little trouble beyond a very slight sensation of heat and pricking. Pressure on the parts will usually cause a small quantity of pus to exude. Then a very fine probe may be inserted for a quarter of an inch, or even deeper, into the orifice thus revealed. Unless properly treated, these peri-urethral folliculites of women may persist indefinitely.

Para-urethral Folliculitis.

Scattered over the vestibule, at the distance of half an inch or a little more from the meatus (according to the natural size of the parts), is a number of mucous follicles which may be affected by gonorrhœa of the urethra, vulva, or vagina. These follicles, when inflamed, look like small red papillæ, from which, upon pressure, a little mucopus or pus will exude. Unless cured, these lesions may remain in a chronic and indolent condition, and they may end in sinuses or in true fistulæ. These fistulæ may end in the urethra near the meatus or farther down the urethral canal. They also may extend toward the vagina in an incomplete form, or they may open into that tube.

Around the fourchette and near the posterior wall of the vagina a number of mucous follicles are seated, and they are sometimes invaded by the gonorrhœal process. These lesions look like small red swellings, from which, on pressure, a little pus may exude. These follicular inflammations are very chronic in character and rebellious to treatment. They may result in sinuses and fistulæ. In some cases the sinus or fistula extends toward the vagina, and in others toward the rectum. As a result, therefore, there may be vulvovaginal or vulvorectal fistulæ. These fistulæ are usually very small, they cause little trouble during long periods of time, and frequently are unrecognized for years.

Many cases of genital folliculitis in women will be met in which absolutely no history of gonorrhœa can be obtained.

Inflammation of Bartholin's Glands.

Bartholin's or the vulvovaginal glands are situated one on either side of the entrance to the vagina, in the triangular space bounded by the ascending ramus of the ischium, the vaginal orifice, and the transversus perinæi muscle, and are covered by the superficial perineal fascia and some fibres of the constrictor vaginæ. They are conglomerate glands, having, when fully developed, a diameter of six-tenths of an inch. The ducts of these glands are about six lines in length, and they open just in front of the hymen near the lateral and posterior carunculæ myrtiformes. These glands pour out in coitus and on genital excitation a copious secretion of albuminous fluid, which lubricates the vulva and the vagina. The vulvovaginal glands may be the seat of two forms of inflammation—the one simple, and the other gonorrhœal.

Simple acute Bartholinitis is mostly seen in young girls, married or single, and generally follows early efforts at coitus. In many cases it results from the violence attendant upon rape. In some cases the simple rupture of the hymen causes local irritation, and as a result one or both vulvovaginal glands become inflamed. Its frequence in very

young married women has caused it to be called "the bride's abscess." It is particularly liable to develop in girls who have leucorrhœa and who are not careful as to the cleanliness of the genital parts. It sometimes results from excessive coitus and also from masturbation.

The **symptoms** are usually quite strongly marked. The patient complains of pain or soreness in the vulva, and inspection reveals a small rounded swelling at the lower or posterior third of the vaginal orifice. This swelling rapidly increases until it may reach the size of a quite small egg. Then the labium major becomes pear-shaped and is pushed outward, and we see a deep-red rounded, fluctuating swelling, which may extend an inch and even more from the level of the vaginal orifice. The parts are the seat of a throbbing, dragging pain, and are exquisitely sensitive to the touch. In this condition, in severe cases, the patients can neither walk, stand, nor sit. They have chills, malaise, and febrile movement. In some cases there is spontaneous rupture through the duct, but in most cases it is necessary to incise the abscess. Sometimes it bursts spontaneously, most commonly near the glandular outlet, and rarely over the convexity of the tumor. The pus is usually thick and yellow, but it may be thin and serous. Exceptionally, it has a fetid odor. In most cases, after incision into or bursting of the abscess, the parts heal and the gland seems to return to its natural condition. In some cases, however, after abscess-formation and pus-extrusion have taken place, the gland seemingly returns to its normal state; yet exacerbations and relapses are liable to occur. Thus, after menstruation the gland may swell and become painful, and in this condition it may remain a little time, and then subside. Such exacerbations as these may be very frequent, and they keep the patients in a continuous state of dread. Excessive venery, masturbation, and leucorrhœal discharges may also light up the suppurative process, with all its local and general disturbances. As the interval of time between exacerbations becomes longer the tendency to them seems to lessen, and generally it dies out; but it is not uncommon to see a woman suffer from acute Bartholinitis several years after her first, second, or third experience.

Usually but one gland is affected, and most commonly it is the left one. The affection may, however, occur bilaterally. In all probability the simple form of Bartholinitis is caused by pus-cocci acting upon a bruised or hyperæmic part thus rendered susceptible to infection.

During the course of gonorrhœa, acute or chronic, the ducts of Bartholin's glands, or the glands themselves, may be the seat of a suppurating inflammation. Of late years there has been a tendency to magnify the frequency of occurrence of these complications of gonorrhœa in women. In acute gonorrhœa the duct and the gland itself are some-

times the seat of inflammation. In chronic gonorrhœa it is more common to find only the duct or the ducts involved.

Gonorrhœal inflammation of the duct of the vulvovaginal glands may be attended with very mild symptoms of heat and pricking, and these may be wholly absent. On inspection we find the opening of these ducts red and a little swollen; the red spots thus produced are called "maculæ gonorrhœica." Pressure on the parts against the ramus of the ischium causes a drop of milky or greenish pus to exude. In some cases this localized inflammation is the only remnant of the gonorrhœal process. It causes little or no discomfort, so that frequently the patient does not know that she has such a trouble. In this indolent condition it may remain for long periods, or it may, as a result of exciting and irritating causes, become acute. The body of the gland may become infected, in which event there may be acute suppuration, but usually the condition is rather indolent and subacute. The gland swells to the size of a nutmeg or walnut, and may be grasped and its contour clearly made out between the finger-tips. The swelling presents a smooth, quite firm structure of roundish or oval outline. Not infrequently the duct of the gland can be felt like a firm round cord. Pressure causes whitish pus to exude. This condition of affairs is found in prostitutes, especially in old ones. It is the cause of much trouble and worry to them, since they are always in dread of a recrudescence of the acute inflammation, which may result from sexual excess or any inflammation about the genitals or in the pelvic cavity.

Gonorrhœa of the Tubes, Ovaries, and Peritoneum.—When gonorrhœa ascends and passes from the uterus to the tubes and beyond, the case then enters the domain of the gynecologist.

VULVOVAGINITIS IN INFANTS AND YOUNG CHILDREN.

Simple Vulvitis.

This form may be found in very young infants and in children from two years onward, and exceptionally even up to puberty.

The attention of the mother is first called to the trouble by the cries of the child on urination and by the frequency of the act. Examination shows the vulva alone to be involved, or this part and the urethra together, or these external parts and the vagina are found affected.

If there is simple vulvitis, we find redness and swelling of the nymphæ and the labia majora (as much of them as is developed), and at first a sero-epithelial secretion looking like milk, then later on a mucopurulent discharge. The surface of the mucous membrane is eroded in minute spots and goodly sized patches. The child's pain is then mainly caused by the scalding sensations caused by the urine lodging on the

excoriated surface. Spontaneous pain may result from the vulvar inflammation.

Another form of simple vulvitis consists in moderate heat, redness, and swelling of the parts, from which pus or mucopus exudes. Thus there are in these young infants two forms of vulvitis—the one mild and ephemeral, with a sero-epithelial discharge moderate in quantity; and the other more severe and attended with greater inflammation and a mucopurulent discharge.

Care and proper medication will soon cure these conditions. When, however, cases are neglected the morbid process extends to the contiguous parts.

Vulvovaginitis.

This affection is found in very young infants and in children from two to thirteen years old.

In infants vulvovaginitis usually begins as a vulvitis, which, being uncared for, becomes more intense and spreads either to the vagina or to the urethra, or to both. As a result there is produced a very formidable affection for such a young subject. In many cases the urethra is not infected, but there seems to be a tendency for the morbid process to extend through the hymeneal introitus, and to involve the vagina and perhaps the cervix uteri.

Examination shows a reddened, eroded surface of the vulva, hymen, and vagina. A copious purulent or mucopurulent secretion escapes from the parts, and it may dry in crusts on the labia majora or even on the thighs. The pus may be thin, and again thick, even to being so gelatinous that it can be taken up by the forceps. In this condition the infant's sufferings are quite severe.

The tendency of the disease is to persist unless proper treatment is adopted; and even then it may run on for months and end in a mild and chronic catarrhal process. When the urethra is involved the child's sufferings are much increased.

When simple vulvovaginitis attains a very severe grade of intensity, it is practically impossible to diagnosticate it from the so-called gonorrhœal form. It will be seen later that the microscope often gives us very little aid.

Gonorrhœal Vulvovaginitis.

It must be distinctly understood that vulvovaginitis is very rarely of venereal origin; and that, if the suppuration does originate in gonorrhœal pus, the infection in most cases takes place in an indirect manner through some medium or agent.

Since so little is really known as to the mode of origin of this form

of vaginitis, and as its onset is unlooked for and insidious, the affection is well on in its course before it is seen by the surgeon. We have no precise data as to the period of incubation, but we are warranted in assuming that the morbid process begins in mild and localized hyperæmia. When first seen these children present the evidence of suffering in their uneasiness and their cries. When the cervix uteri is involved they also suffer from bellyache. We find an intensely red and tumefied, superficially eroded, and even bleeding condition of the vulvar structures of the introitus vaginæ, of the vagina itself, and also of the cervix uteri, from which pus may drip. A profuse yellowish-green discharge escapes from the hymeneal orifice and is found smeared over the vulva. Very often this pus dries into crusts upon the labia majora and upon the inner surface of the thighs. There is very often intertrigo, even of a severe type, on the latter regions. When the urethra is involved urination is frequent and painful. Then when the urine flows over the inflamed vulva the child's sufferings are great.

Course.—The course of the affection is dependent upon the care given the child and the nature of the treatment adopted. Under the most favorable conditions the affection is often very obstinate, and in neglected or insufficiently cared-for infants it runs on indefinitely if unchecked. If a child afflicted with this disease is cured in two or three months, the result may be pronounced brilliant. In very many cases the disease runs on and ends in a chronic catarrhal condition.

There can be no question as to the infectious quality of pus derived from this disease, since there are many cases on record in which it has produced severe vulvovaginitis and also intense purulent ophthalmia, which as a complication of the disease stands first. This form of the affection is seen in babes in the arms and in children from two to ten years old. In families we see sporadic outbreaks, and in hospitals and maternities more or less severe and extensive epidemics.

Gonorrhœal rheumatism is, according to statistics, a rather rare complication of purulent vulvovaginitis.

Etiology.—In the cases of young infants it is often impossible to learn any facts as to the source of infection.

Usually infants are brought suffering from vulvovaginitis when they are some weeks or months old. In very many instances the only assumption warranted is that the more or less severe process began in the physiological hyperæmia which is constantly present in young children. In the absence of negative proof it may be confidently asserted that many cases of this affection originate *de novo*, without the implantation of an infectious secretion.

Undoubtedly, many infants are infected by some means from pus from the vaginæ of their mothers or nurses. I have heard of mothers

and nurses who quieted their infants and charges by placing a finger in the vulva, and I can understand that a soiled finger might carry infection. Then, again, sponges used by mothers suffering from leucorrhœa have also been used upon their infants, who became affected with vulvovaginitis.

When the child of poverty and squalor gets out of arms and sleeps and mingles with older girls and women, it is liable to contract vulvovaginitis accidentally, conveyed by means of infected fingers and mainly by soiled underwear, sponges, and towels. From one suffering child other members of the family or its playmates may be infected in the vulva or the eyes by either the simple catarrhal or the so-called gonorrhœal form of the disease.

Among older girls direct gonorrhœal infection may occur as a result of attempted or complete coitus with young boys. There are many such instances in medical literature. Then, again, infection may occur among several or many young girls through their own bad habits.

Succinctly stated, the truth of the question of etiology is this: In many cases the clinical history and microscopic picture establish a diagnosis of simple catarrhal vulvovaginitis; in other cases the clinical and microscopical evidence points clearly to gonorrhœa; but in still other cases, though the symptom-complex is complete and the microscopical picture points to gonorrhœa, absolutely no evidence can be obtained to prove that the disease has had a venereal origin or has originated in gonorrhœal pus. On the other hand, all facts point to the suppuration having begun in a simple catarrhal form, and by reason of dirt and uncleanliness has assumed all the features of a severe gonorrhœal inflammation. I am clearly of the opinion that in many cases which have been regarded as undoubtedly of gonorrhœal nature the morbid process originated *de novo* in a simple catarrhal process.

There can be no doubt that onanism, the eruptive fevers, seat-worms, pediculi, eczema, and perhaps impetigo and herpes, act simply as contributory causes. They establish a low form of irritative process, and thus render the tissues susceptible to microbic invasion and inflammation, while dirt, the exposed condition of the parts, unremoved discharges, and general uncleanliness and want of care combined contribute to the production of a very formidable suppurative process.

Treatment of Gonorrhœa in the Female.—In the treatment of gonorrhœa in the female the prime essentials are scrupulous cleanliness, copious antiseptic injections and flushings, and constant care as to details. The patient should be made to understand clearly the gravity of the disease, and its tendency to continued upward extension and to localize itself in the recesses and crypts of the genitalia; and she should be urged to continue under observation until she is pronounced cured

by the surgeon. It is the duty of the latter to make thorough and painstaking examinations of the whole genito-urinary tract, and to acquaint himself with the full extent of the disease. The various morbid secretions should be examined by means of the microscope with a high-power lens and oil-immersion.

In acute cases the recumbent position should be insisted upon. The diet should be of the simplest character, and preferably of milk. A brisk cathartic may be given, and throughout the course of the disease one or more full movements of the bowels should occur each day.

Treatment of Gonorrhœa of the Vulva.—For gonorrhœa of the vulva, with all its painful accompaniments in the acute stage, very hot sitz-baths, repeated four or more times daily if possible, should be used, taking care that the water is brought into free contact with the whole surface affected. Very often the itching and burning are much allayed by affusions of hot alkaline solutions (powd. borax or supercarbonate of soda, ʒij to water ℥xxxij), to which may be added two to four drachms of wine of opium or laudanum. Lead-and-opium lotion may also be used. With this may be saturated pledgets of lint or of absorbent gauze, which should be carefully and thoroughly applied to the surfaces in order to keep them apart, and renewed very frequently, since they soon become saturated with pus. So soon as the vulvar orifice will permit, a soft catheter, No. 15 F., or the long tube of a Davidson or fountain syringe, should be introduced as far as it will go, and several copious injections of very hot alkaline water should be made every day. As the inflammation declines it may be necessary to paint the parts to their smallest recesses with a solution of nitrate of silver, thirty grains to the ounce of water, followed by hot ablutions with a solution of common salt. After a very hot sitz-bath the lead-opium-and-borax lotion may again be applied. In twenty-four hours after this application to the old or the young much improvement will be noted in the lessened œdema and redness and in a less painful condition. Then a 1 per cent. solution of alum, with laudanum, may be used; and later on the parts may be dusted with subnitrate of bismuth or powdered boracic acid on a pledget of lint or absorbent gauze.

When the inflammation is on the wane the parts may be carefully swabbed with a solution of nitrate of silver 1 : 100, which may be gradually increased in strength to 5 : 100. After each swabbing the soothing remedies already mentioned may be used continuously.

Treatment of Gonorrhœa of the Urethra.—Vulvar gonorrhœa is very frequently, sooner or later, accompanied with implication of the urethra and increase in the patient's sufferings. The solution of bicarbonate of potassa with hyoscyamus recommended for acute gonorrhœa of the male may be given in order to neutralize the acidity

of the urine; and diluent drinks, such as flaxseed and slippery-elm teas and barley-water, may be taken *ad libitum*. As soon as the inflammation in the urethra has somewhat subsided from the use of the foregoing measures suitable for the acute stage of vulvitis, intra-urethral injections of very hot water with borax or boracic acid, ʒiij to ℥xxxij, frequently made by means of any recurrent syringe or catheter, or preferably by means of Skene's reflux catheter, may be used. As the inflammation subsides, intra-urethral injections of hot water, containing carbolic acid in the proportion of ½ of 1 per cent., are very beneficial. In many instances where the pain on urination is very great the instillation into the urethra of a solution of opium in glycerin, or of cocaine muriate in glycerin and water, by means of a small cylindrical dropping-pipe, is followed by marked relief. As the urethral lesion further declines, a 2 per cent. solution of nitrate of silver may be injected as far down the urethra as possible, since it is commonly involved in its whole length; or a thirty-grain-to-the-ounce solution of nitrate of silver may be carefully and sparingly applied by means of an applicator facilitated by the endoscope or a Sims fenestrated speculum. It is only in the subacute and chronic stages that antiblennorrhagics are to be used, and then in rather smaller doses than in the male. In some cases these agents produce marked relief in the symptoms and a lessening of the discharge, and, again, they seem to be of no benefit at all; from which it follows that local measures are always the most certain.

Treatment of Gonorrhœa of the Vagina.—Gonorrhœa of the lower part of the vagina, which is commonly accompanied with the same affection of the vulva and perhaps of the urethra, should be treated on the principles already given. As soon as the acute symptoms subside, copious irrigations of very hot water well into the canal should be made. Then, as soon as the irritability of the parts will permit, the surgeon should make a thorough examination, having at his command a perfect light, natural or artificial. In my judgment, the genupectoral position, though objectionable to patients from feelings of delicacy and by reason of its uncomfortableness, is by far the best by which to obtain a thorough view of the whole vagina, including the cervix uteri and the posterior and the anterior fornix vaginæ. The blade of a Sims speculum carefully introduced elevates the posterior vaginal wall, and free inspection is possible.

When the very acute symptoms of gonorrhœal vaginitis have begun to subside, the inflamed surfaces may be carefully and thoroughly cleansed by means of a cotton-holder. Then the whole surface may be exposed by the wire speculum, and then gently and sparingly touched with a thirty-grain-to-the-ounce solution of nitrate of silver, after which the canal should be thoroughly irrigated with hot water to which a

little common salt has been added. Another and less commendable and precise way of applying the nitrate-of-silver solution is to pass a Fergusson speculum so as to encircle the cervix uteri, which is touched with the solution on a cotton-holder. Then one or two drachms of it are poured into the speculum, when, on withdrawal with a rotary motion, the solution will come in contact with the vaginal walls. After this application, which should be thoroughly made in the posterior and the anterior fornix, and also to the uterus, usually as far as the os internum, the vagina should be thoroughly tamponed with iodoform gauze. In many cases, the nitrate-of-silver solution having been applied once or twice, much benefit will follow the deposition deep into the vagina of a considerable amount of powdered boracic acid, which should be retained by the gauze or wood-wool tampon. Whatever form of tampon is used, it should be removed with great care every twenty-four or forty-eight hours, and then copious hot boracic-acid irrigations should be made. The frequency and strength of the nitrate-of-silver applications should be determined by the progress of the case. Usually, several days should elapse before a second application is made; and if the patient is under control, two or three are enough.

Bichloride-of-mercury irrigations may in a measure allay the irritation, but they generally fail to produce a cure. In chronic vaginitis extract of Pinus canadensis may be used on tampons.

Treatment of Gonorrhœa of the Os and Uterine Cavity.—There is no form of gonorrhœa in women that demands greater skill, judgment, and conservatism than gonorrhœal infections of the os and uterine cavity. In these delicate parts energetic treatment should be promptly instituted in order to prevent, if possible, the further upward spread of the infection. Unfortunately, the general practitioner is, as a rule, not sufficiently versed in the course of the disease and skilled in its handling to warrant his active intervention in these cases, and my advice to any one not thus equipped is, when he has these cases under his care, promptly to call in the aid of a conservative gynecologist.

It is well for the surgeon to bear in mind that in these cases the disease quickly localizes itself deeply in the mucous membrane of the cervix, and then assumes a chronic condition, which at any time under stimulation may become acute. To treat these cases properly the os must be dilated, and then the mucous membrane must either be curetted or to it must be applied quite strong caustic solutions (chloride of zinc (Lugol's solution)), etc. These operations should be done with special skill and good judgment under favorable home or hospital conditions, and with the utmost regard for asepsis and antisepsis. Therefore I say that, as a rule, these cases do not belong to the genito-urinary surgeon, but should be treated by men well versed in women's diseases.

Treatment of Bartholin's Glands.—In the treatment of abscess of Bartholin's glands general surgical principles should prevail. If an incision is necessary, it should be freely made over the most fluctuating part of the tumor. Then, after thorough curetting and antiseptic irrigation, the parts should be well packed with iodoform gauze, which when the inflammatory symptoms have subsided may be replaced by balsam-of-Peru gauze. These packings should be carefully applied until full healing has been produced. In chronic cases it is good surgery to extirpate the gland as soon as possible, since it is almost certain that exacerbations will occur sooner or later.

Treatment of Folliculitis.—Whenever the anatomical arrangement of the parts will allow of the slitting up of the various follicles in the vulva and urethra when the seat of chronic gonorrhœa, this little operation should be performed with all antiseptic care. Then, after cauterization with a solution of nitrate of silver, 6 : 100, by means of an applicator or a hypodermic syringe with a blunt-pointed needle, the little cavity should be packed and caused to heal from the bottom. Sometimes these little inflammatory foci cause much trouble to the surgeon, and ultimately it is necessary to extirpate them.

Treatment of Vulvovaginitis in Infants and Young Children.—The first duty of the surgeon in all cases of vulvovaginitis is to insist upon the observance of absolute cleanliness of the infant, of its clothes, and of its surroundings. The next is the enforcement of prophylaxis for the children and adults of the family. These facts must be vividly impressed upon the mother or nurse, or upon any one who may temporarily care for the child.

In hospitals and nurseries a child should be isolated immediately it is discovered that it is infected; and if possible it should be cared for by nurses who wait on it alone. A nurse having charge of a child thus affected should not be allowed to care for other non-affected children. In the event of necessity, when a special nurse cannot be detailed to the case, she should be thoroughly instructed as to how not to carry infection or allow it to occur in uninfected children. By rigid discipline the spread of the disease (which in some epidemics is like wild-fire) may be limited to the original case or cases.

The desquamative catarrhal condition of the genitals of new-born girls may be treated by cleanliness, by free injections into the vagina of warm solutions of boric acid or diluted Goulard's water, followed by cleanliness and dryness of the parts, obtained by means of some dusting-powder. Whenever it is possible in these cases a pledget of absorbent cotton should be placed in the vulva, and it should be frequently renewed.

For severe cases of the simple and so-called gonorrhœal type a care-

fully conducted, methodical treatment is necessary. Very thorough irrigation of the parts with a warm bichloride solution (1 : 6000 or 1 : 10,000) may be used several times daily. After this cleansing process the vagina should be expanded by means of a double-bladed male urethral speculum, and the parts made dry by absorbent cotton on an applicator. Then a 10 per cent. nitrate-of-silver solution is carefully applied to the whole inflamed surface. The applications should be made by the surgeon or by an intelligent nurse, and they should be thorough. Infants struggle and resist when any mode of treatment is used, so it is necessary to have a convenient table, good light, and all suitable instruments and appliances ready at hand. Alkaline mixtures containing tincture of hyoscyamus may be given, with benefit, to relieve the burning on urination.

Iodoform in the form of bougies may be used, but there is no certainty of good resulting from it.

Under the application of the solution of nitrate of silver benefit will occur; and it will be observed that the color of the discharge is transformed from a greenish to a grayish milky hue, and that the gonococci (if found in the course of the case) will have become much less numerous in the specimens examined. In this event the treatment may be continued by means of warm irrigations of nitrate of silver (1 or 2 : 2000), given once or twice a day. In almost every case the cure will be slow and exacerbations may be expected, and the patience of the surgeon and the fortitude of the mother may be sorely taxed. Still, in any event, care must not be relaxed nor should the treatment be suspended.

CHAPTER X.

STRICTURE OF THE URETHRA.

A FULL knowledge of chronic anterior and posterior urethritis and of their pathological anatomy is absolutely essential to the clear comprehension of the nature and course of stricture of the urethra. While true gonorrhœal stricture of the urethra is only found in the anterior part of the canal, it is very essential that the inflammatory condition of the posterior part which frequently coexists should be well understood. It is necessary to emphasize this point, since nearly all authors concern themselves solely with the morbid changes which take place in the anterior urethra.

It has been shown (see page 74) that in chronic anterior urethritis the essential lesion is a more or less extensive small-cell infiltration into the submucous connective-tissue layer and a chronic catarrhal condition of the mucous membrane itself. These pathological conditions may disappear, perhaps spontaneously in some cases, but generally as the result of treatment. On the other hand, when this localized inflammatory process persists for a very long time, it leads to certain permanent cell-changes which materially lessen the calibre and impair the dilatability of the urethra and interfere with its function.

This affection is a rather frequent sequela of gonorrhœa, and it also may be the result of traumatism. Certain stenoses of the urethra in the glans penis have been termed congenital strictures, therefore we broadly divide stricture of the urethra as follows: congenital, traumatic, and gonorrhœal stricture, the two latter being acquired forms. Acquired stricture of the urethra may be defined as a condition of the canal attended by decidedly well-marked contraction or stenosis, and an utter loss of normal dilatability caused by an inflammatory process which produces a sclerosis of greater or less density and contractile power.

The male urethra is a membranous canal whose walls are in contact with each other, and is composed of three layers: 1, an internal layer of mucous membrane; 2, a submucous connective-tissue layer; and 3, a well developed muscular layer which consists of circular and longitudinal fibres.

The urethra is for purposes of description divided into the penile or pendulous portion, which extends from the meatus to the penoscrotal angle; a bulbous portion, which is the continuation up to the triangular

ligament; a membranous portion, which is the segment seated between the two layers of this ligament, and a prostatic portion, which begins at the apex of the prostate and extends to its base.

The average length of the urethra is about 8½ inches, of which the pendulous portion includes 6½ inches, the membranous ¾ of an inch, and the prostatic 1¼ or 1½ inches.

The calibre of the urethra varies in different individuals, and is not at all uniform in the course of the canal. Taking a general average, the following dimensions may be accepted as correct concerning the calibre of the urethra in its various portions:

Meatus, 7 to 9 mm.	21 to 28 F.
Fossa navicularis, 10 to 11 mm.	30 to 33 F.
Middle of pendulous portion, 9 to 10 mm.	27 to 30 F.
Bulb, 11 to 12 mm.	33 to 36 F.
Membranous urethra, 9 mm.	27 F.
At apex of prostate, 10 mm.	30 F.
Middle of prostate, 15 mm.	45 F.
Vesical end of prostate, 11 mm.	33 F.

It is a safe rule to take 30 French as the average normal calibre of the urethra, with the understanding that there are exceptional cases, some of which are under and some over that average.

For practical purposes it is well to further divide the urethra, following Thompson, into those regions which may be the seat of operation; they are as follows: Region 1, which includes the membranous and 1 inch of the bulbous urethra, and is about 1¾ inches long. Region 2, which begins at the anterior limit of region 1 and extends to within 2½ inches of the meatus, being nearly 3 inches long; and region 3, which begins at the meatus and includes the distal 2½ inches of the urethra.

The great majority of cases of stricture are found in Region 1, while Regions 2 and 3 are not infrequently affected.

From a pathological standpoint stricture may be divided into soft, semifibrous and inodular or densely fibrous varieties.

In soft stricture the round-cell infiltration around the canal is quite dense, and has not as yet undergone fibrous proliferation.

In semifibrous stricture more or less of the cellular exudation has become changed into fusiform cells, and the lesion consists of a general mingling of round-cell exudation with young fibrous tissue.

Inodular stricture is the direct outcome of the two forms just mentioned and consists of a circular mass of true fibrous tissue lined with mucous membrane. Stricture-formation may be limited to the submucous connective-tissue layer, but it may involve the muscular layer and later on encroach more or less upon the corpus spongiosum. In the bulbous urethra inodular stricture is prone to develop and wholly replace the elastic and muscular fibres so plentiful in this region.

As a rule, stricture-formation is confined to the anterior urethra and particularly the bulbo-membranous junction and does not show a tendency to pass through the opening in the triangular ligament. But in some rather rare cases the morbid process exceeds the usual limit and involves the membranous urethra in part or totally. It is safe to say that gonorrhœa does not produce primary stricture of the membranous urethra. Gonorrhœal stricture of the prostatic urethra has never been found.

Causes of Stricture.—In the vast majority of cases gonorrhœa is the cause of urethral stricture.

In somewhat rare cases we learn from a patient having a tight stricture that he had but one attack of gonorrhœa, or perhaps two, and that the disease did not persist very long. In the majority of cases of stricture there is a history of repeated recrudescence of an original gonorrhœa or a greater or less number of new infections.

The long continuance of gonorrhœa is the essential cause of stricture rather than the severity of the attack.

In the minds of the laity injections play an important part in the production of urethral stricture. This view has no foundation in fact, since mild injections are productive of some good, and strong and severe ones are so painful in their effects that they are soon given up.

In some rare cases stricture of the meatus has been caused by scleroderma and keloid of the glans penis.

It may also result from the healing of chancres and chancroids and of phagedena at the meatus.

In contradistinction to gonorrhœal stricture it is necessary to consider congenital and traumatic strictures.

Congenital Stricture.

Congenital stricture of the urethra is very rare, and is limited to certain cases in which there is contraction either at the meatus or at the distal part of the fossa navicularis. The narrowing of the meatus is either due to the development of mucous membrane or to the smallness of the orifice in the glans penis. It exists in various degrees, and it may be as small as a pin-head or somewhat larger. In many cases of children difficulty in urination is experienced as a result of this stenosis.

Cases have been reported in medical literature in which strictures seated in the pendulous and bulbous urethra have been thought to be of congenital origin, but their histories have been so vague and unsatisfactory that no definite conclusions can be drawn from them. Undoubtedly in some instances in which stricture of the urethra has been found in young boys and adolescents without a history of recent gonorrhœa, the morbid process began in early life as a result of non-specific

or specific urethritis, of which no history could be obtained. In some cases traumatism of the urethra occurring in early life and forgotten may be the cause of stricture in young subjects.

Treatment.—The directions given on page 195 for the treatment of contractions and strictures at the meatus will apply with equal force to congenital narrowing of this orifice.

Traumatic Stricture.

This affection occurs as a result of blows, kicks, and falls upon the perineum on such articles as rails, barrels, pails, joists, and chairs, which cause damage to the urethral canal. The injury may be partial when only the lower portions of the urethra are cut through; it may involve all of the canal except the upper portions, or the tear may involve the whole lumen of the urethra. In most cases traumatic stricture occurs in the bulbous urethra without damage to the triangular ligament, but in some instances this structure is more or less torn. In rather exceptional cases the membranous urethra is the seat of lesion, and in very rare ones the prostatic urethra is damaged. Rupture, partial or complete, of the membranous or prostatic urethra is generally caused by fracture of the pelvis and also by crushing blows and falls upon the perineum. When the urethra is ruptured in the bulbous portion, a large purplish swelling is soon found in the perineum and scrotum.

Rupture of the membranous and prostatic urethra may not be attended by any visible signs beyond perhaps contusion of the perineum, but the finger in the rectum will clearly make out a goodly-sized, painful swelling around or starting from these segments of the urethra.

In cases of rupture of the bulbous urethra there is usually difficulty in urinating or total inability. When these cases are unrelieved the bladder becomes very much distended, and in a day or two febrile symptoms may develop.

Rupture of the membranous and prostatic urethra when not promptly relieved inevitably leads to urinary extravasation (see page 222). When occurring together with fracture of the pelvis the prognosis is very grave.

Damage to the urethra in any locality is a very serious condition for the reason that if not properly treated, and perhaps owing to the irritating effects of the urine, a most obstinate, very hard, tough, and retractile stricture inevitably forms.

Treatment.—In all cases when the bulbous, membranous, or prostatic urethra is the seat of damage, external urethrotomy should be promptly performed. The blood-clots are to be turned out, the parts are freely irrigated, and the torn edges of the wound are sought for, brought evenly together, and stitched with several catgut sutures.

When the rupture has been incomplete, it is usually easy to find the torn ends of the urethra; when it is complete, difficulty may be encountered, but it must be overcome. It is important in applying the sutures to include only the cavernous and muscular tissues and to spare the mucous membrane. A catheter is passed into the bladder and there retained, the wound on the outside being left slightly open for drainage. In a few days the catheter may be taken out, after which it is necessary to pass an olivary bougie or a sound every week or oftener. If this treatment is carefully followed, the resulting damage will not be very great, and it is fair to hope that recontraction of the canal will not occur.

In the event of the formation of a dense nodular retractile traumatic stricture the surgeon can follow the indications for operation as the case presents; he may resect the morbid portion of the urethra, and then approximate and suture the cut ends; he may resect and having passed a catheter allow the wound to granulate and heal, or he may endeavor to make a splice in the canal by means of the transplantation of mucous membrane.

When healing has finally been produced it is important that the patient should be made to understand very clearly that for the rest of his life the frequent and careful introduction of a sound is necessary in order to prevent recontraction of the urethral canal.

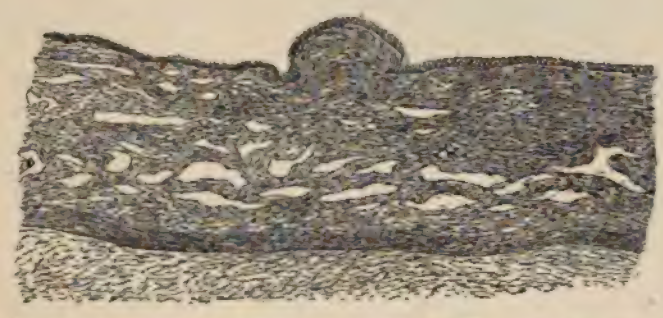
Pathology of Gonorrhœal Stricture.—A better understanding of this subject will be gained by first reading the section on the Pathology of Chronic Gonorrhœa (see page 77 *et seq.*).

Early in chronic urethritis the newly-formed submucous-tissue infiltration is still soft and succulent, and when it produces very decided diminution of the calibre of the urethral canal it may be called "soft stricture." As the morbid tissue grows older, and connective-tissue cells take the place of the small round-cells, it becomes more condensed, and then the stricture can no longer be called soft, and the term "semi-fibrous" may be applied to it. Thus in the domain of chronic anterior urethritis we recognize in clinical practice, as ulterior results, the soft and the semi-fibrous strictures. These rather succulent strictures as time goes on may become more condensed, and then what is known as incular stricture is produced.

Figs. 35 and 36 illustrate two forms of stricture of the urethra. In Fig. 35 is shown one of the forms of large-calibred stricture, while Fig. 36 is from a section of a more extensive tight stricture, contracting the urethra to a considerable degree. These figures serve not only as a text for the exposition of the detailed minute anatomy of urethral stricture, but also as a practical demonstration of the topographical distribution and general structure of two extreme forms of strictures.

Both of these strictures were evident to gross inspection. In Fig. 35 is a section of the stricture shown grossly in Fig. 52. This stricture was situated in about the middle of the anterior urethra; it lay a little

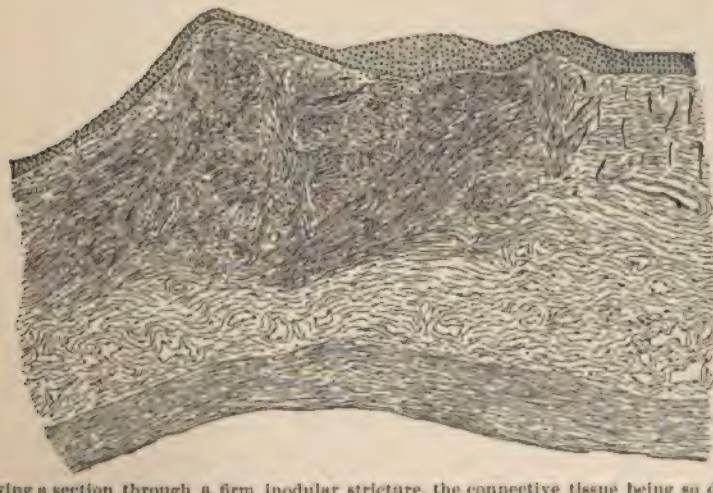
Fig. 35.



Showing a section through a superficially-seated stricture, with moderately dense, newly-formed connective tissue.

to one side of the roof of the urethra, and looked like a bit of coarse cotton thread stretching across the surface of the membrane for a very limited distance—only three or four millimetres. The urethra was per-

Fig. 36.



Showing a section through a firm inodular stricture, the connective tissue being so dense as to resemble cicatricial tissue.

fectly normal both above and below the tiny constricting band or thread. A vertical section of the urethra passing transversely through this little band presents the appearance shown in Fig. 35.

This stricture is very superficial; in fact, most of it is raised up

above the surface of the urethra, although a slight amount of connective tissue stretches out in the mucosa on either side of the centrally-elevated nodule which corresponded to the thread-like band shown. In Fig. 35 the stricture is composed of fairly dense newly-formed connective tissue, which, however, lies very superficially: the wall of the urethra itself is but very little invaded by the stricture. This is a good illustration of the least-developed form of stricture. This band or ring form of stricture is not common, and may be said to be in reality rare. In this case but one imperfect band was present, but in very exceptional instances several bands may be found. As a general rule, when bands of stricture exist, the whole expanse of mucous membrane on which they appear is the seat of morbid change. This first form of stricture belongs to the category of rather mild and superficial fibrous stricture.

Fig. 36 shows a much more extensively developed form of stricture. In this instance the lumen of the urethra was considerably narrowed—approximately to about the calibre of a No. 9 or 10 sound (French). This stricture formed an annular ridge extending transversely about one-quarter way round the urethra at the junction of the membranous with the bulbous portions. In the vertical section (Fig. 36) of the urethra passing through the stricture it will be seen that the stricture is due to the development of a conical lump of newly-formed connective tissue which extends deeply into the wall of the urethra, so as to involve the membrane very extensively, almost down to the albuginea. This mass of connective tissue is very dense, and forms a fairly rigid body, and altogether it has the structure resembling cicatricial tissue. The interlacing strands of dense fibrillated fibres composing the mass pass in several directions: many of them pass circularly about the urethra, while others run up and down the canal for a short distance. Over the centre of the stricture the urethral surface is elevated in a conical point, while on either side the epithelium is somewhat thickened. At the right-hand side of the drawing the mucosa is thickened, and some newly-formed vessels pass up vertically toward the surface, as is generally the case in the skin.

This latter stricture is in striking contrast to the previous one in its lack of elasticity, extensive involvement of the urethral wall, and correspondingly greater degree of narrowing of the urethral canal. It is merely necessary to say that in this case only a limited portion of the lumen of the urethra was involved, and it is here portrayed and described in order that the pathological condition can be placed in contrast with the healthy tissues around it. In cases in which the process is deeper and denser the same pathological conditions are presented. As the stricture increases in extent and depth the same cicatricial tissue is

formed, going down as far as the tunica albuginea, and even involving it and surrounding the whole lumen of the urethra.

This form of stricture is known in clinical practice as the inodular stricture, which, when fully developed, involves a greater or less segment of the urethral canal in its totality.

Development and Course of Stricture.—The opinion is very generally held by surgeons that the development and course of stricture of the urethra are, as a rule, quite rapid. Many of the laity also share this view, and, as a result, the surgeon is frequently asked or importuned by men recovering from gonorrhœa to pass a sound in order to prevent stricture. Unfortunately, the surgeon often yields, and commonly to the sorrow of the patient.

The truth is that in its development stricture-formation may be quite rapid, but that, as a rule, it is moderately slow, and that in a goodly proportion of cases five, ten to twenty years may elapse, and yet the normal urethral calibre will only be reduced about one-third or even less. To the latter category belong the very slow cases. It is significant of the usual slowly-developing character of stricture that the greatest number of patients apply for relief between the twenty-fifth and fiftieth years.

Symptoms of Stricture.—One of the earliest symptoms of stricture is a slight mucopurulent discharge, which may be observed only in the morning, as already described (see Chronic Anterior Urethritis), or it may, in exceptional cases, be noticed at intervals during the day. Usually the quantity of secretion is very scant, but exceptionally a good-sized drop may be expressed from the meatus once or twice a day, and perhaps oftener. There is greater or less pus-formation in all cases of stricture, but it usually can only be seen by examining the urine. When stricture is uncomplicated with bladder inflammation, the urine is usually clear, but contains more or less threads and lumpy masses. In some quite old cases there may be some pus and much flat epithelium in a state of fatty degeneration.

Some patients quite early or at more remote periods after gonorrhœa complain of various subjective symptoms, such as slight uneasiness, a mild smarting, or a decidedly burning pain during micturition. In some cases increased frequency of urination, with pain at the beginning or end of the act, is experienced, due to coexistent chronic posterior urethritis. In other cases there is concomitant urethro-cystitis even quite early in the development of the stricture.

As a rule, I think that strictures in the pendulous urethra are sometimes attended with the uneasy smarting and mildly burning sensation in the canal and at the end of the penis, while those in the subpubic portion are sometimes complicated with decidedly burning, even scald-

ing, pains, particularly when the posterior urethra and bladder are also involved.

Another striking symptom may be complained of quite early—namely, a more frequent desire to make water. Great variation in this symptom is observed in the general run of cases. In some patients the intervals between urination may be three or four hours, and in others they may be much shorter, the desire coming every hour or even more frequently. This great frequency, however, is commonly seen in old cases complicated with cystitis. At first the desire is experienced during the day, but as the morbid condition increases the sufferer finds that he has to empty his bladder several times during the night.

As the stenosis of the urethra increases the expulsive power of the bladder is materially impaired. Some patients state that the first intimation of a stricture known to them was the necessity for greater than usual force in voiding their urine. This symptom may in some cases be noticed quite early, but, as a general rule, the stricture is well advanced and the urethral lumen quite small before it is experienced. In general, the bladder gradually accommodates itself to the extra strain put upon it by means of the hypertrophy of its muscular fibres. Owing to this fact, a patient, particularly an obtuse or an insensitive or careless one, may not for several years appreciate the fact that there is an impediment to his stream, and that he uses more than ordinary expulsive power. In cases where the stricture forms rapidly this symptom may quite promptly be appreciated.

Synchronously with the diminished explosive power of the bladder, changes in the shape of the stream of urine may occur, and they usually make an impression on the patient's mind. In very many cases, though other symptoms have existed, this is the first one to attract the patient's attention. The shape of the stream depends largely on the conformation of the meatus. If this slit is wide, the urine may escape in two small streams—one with an upward tendency, while the lower one curves over and falls barely beyond the patient's toes. Then, again, in cases of large meatus a sputtering, broken, and short, or a flat, fan-like stream may be observed. When the meatus is normal or quite small the stream may be thin and wiry, and perhaps a little twisted. Then, again, it may be very much twisted, forked, and corkscrew-like. In some cases the stream, though small, is quite strong and is well projected, while in others it is weak, hesitating, intermittent, and falls within a few inches of the patient's body, often wetting his clothes. In almost all well-advanced cases there is more or less dribbling of urine after micturition, owing to the inelasticity of the urethral walls and imperfect closure of the canal, and the diminished contractile power of the accelerator urinæ muscle and of the involuntary fibres of the corpus spongiosum. This

symptom may be well marked in cases of stricture in the deep urethra, and it is usually very pronounced when the pendulous urethra is involved.

In more advanced cases patients may experience more or less difficulty in starting the stream of urine. They frequently make several attempts during one or more minutes before the urine appears, and then it frequently stops, and renewed efforts are required to start it again. As the stenosis grows more compact and the urethral canal is more and more contracted all these disturbances in urination may become more severe and constant. The patient experiences a constant desire to make water, and the act is attended with much pain. There is often pain in the bladder and above the pubis, in the perineum, testes, vas deferens, and groins. In some cases patients complain of a constant dull aching or spasmodic pain in the glans penis, which may lead the surgeon to suspect stone in the bladder. The mucous membrane behind the stricture often becomes inflamed, and then this condition may attack the ejaculatory ducts, the verumontanum, and the seminal vesicles, and may disturb their function. As a result, there may be sexual inability or frequent emissions, pain on coitus, and ejaculation may be attended by a severe stabbing pain. In some cases the semen passes backward, and is later on discharged with the urine. In such instances the power of fecundation is lost.

In advanced cases, where great straining is necessary for the expulsion of the urine, prolapse of the rectum, hemorrhoids, and uneasy and painful sensations in the rectum, perhaps with spasm of its muscles, may result. In some cases the contents of the rectum are expelled with every attempt at urination. In these cases we frequently see that the penis is more or less congested, the blood remaining, occasionally from mild extravasation, in the areolæ of the corpora cavernosa and corpus spongiosum, and giving them an unusually firm consistence. Then, again, painful erections, like chordee, may occur, and, as a result, there may be mild hæmaturia.

Epididymitis and epididymo-orchitis of a low form and with slow and not painful invasion may sometimes occur rather late in the course of stricture. In somewhat exceptional cases these complications come on rapidly, with much pain.

In old men with firm stricture hernia may be produced by the great efforts in straining. In these old cases it is not uncommon to observe a more or less profuse mucopurulent discharge, either transparent or opaque.

Retention of urine is a quite common complication of stricture of the urethra, particularly in cases in which the stenosis is in Region No. 1. It is observed less frequently when Regions Nos. 2 and 3 are the seats

of contraction. In some cases this complication is the first warning indication of the presence of stricture.

Some patients seem particularly susceptible to retention of urine, which seizes them at shorter or longer intervals for years. Others, again, in spite of many and varied hygienic and sexual transgressions, seem to be free from this accident. In still other cases during a period of twenty-five or more years retention may occur but once or twice, even though the patient leads a free-and-easy life. Retention is, as has been stated, due to hyperæmia of the mucous membrane lining the stricture and spasm of the compressor urethræ muscle.

In some old cases of very tight stricture the urine constantly dribbles from the meatus, and patients thus afflicted are said to suffer from incontinence. In this condition there is a constantly distended bladder, and the external sphincter vesicæ and compressor urethræ muscle, having lost much of their tonicity, possess but feeble contractile power, and as a result the urine dribbles away. In such cases the genitals and thighs may become much excoriated, the under-linen and trousers are constantly soaked, and the patient carries with him an offensive odor of decomposed urine. In this condition there is usually sufficient overflow to relieve the patient of the imperative desire to urinate which is so constant in retention.

Complications occurring in the Course of Stricture.—As a result of advanced stricture the urethra posterior to it becomes more or less dilated, and its walls attenuated in spots or patches by the retarded stream of urine forced forward by bladder-contraction. This dilatation involves the membranous and prostatic urethra, and it may be so extensive that the fore-finger may be readily admitted into the canal. In some cases a decided pouch is produced. The mucosa and its underlying connective-tissue layer are much thickened, the prostatic and ejaculatory ducts are dilated, and the floor of the urethra is traversed with longitudinal and irregular septa, between which are little pouches of dilatation.

Superficial and deep ulcerations very frequently occur behind old strictures. In some cases large and ragged excavations are produced. Concretions are not infrequently found imbedded in the urethral mucous membrane.

Abscesses and fistulæ sometimes develop in the neighborhood of strictures. They may begin in inflamed follicles or in small ulcerated spots which allow the escape of a few drops of urine into the surrounding connective tissue. They then burrow in various directions, and form hard, circumscribed masses on the external surface, which soften and give rise to fistulæ, of which many may open on the perineum, the scrotum, the nates and thighs, and upon the abdomen as high up as the

PLATE III.

COMPLICATIONS OF STRICTURE.

Dilatation of urethra behind stricture and hypertrophy of blad

marked condition of ill-health supervenes. These patients become sallow, have much digestive disturbance, and rapidly lose weight. They become chronic invalids, complain constantly, are anxious and careworn, and suffer from pain in the back and loins. They not infrequently have symptoms similar to fever and ague. In an advanced case every few minutes the patient has a desire to pass his urine. He then strains violently, writhes with intense pain and agony, and breaks out in a cold sweat, and, as a result, he is perhaps able to expel only a few drops of putrid, scalding urine. These sufferings, which make the patient a pitiable object, have much to do with hastening death. In some cases mild or severe urethral fever follows every attempt, no matter how gentle, at instrumentation of the urethra.

Pains at such remote parts as the heel and the sole of the foot have been complained of, as well as neuralgic affections of the testes, abdomen, and thighs.

In some very bad cases the patient continually loses ground, and finally dies of exhaustion. In other cases a low grade of urinary fever, with marked evidences of malnutrition, tortures the patient until death relieves him.

Varieties of Stricture.—A number of terms are used in the description of the various forms of stricture. The thread-like form consists of one or more thin bands, usually seated just under the mucous membrane and not involving the submucosa deeply. This is also called the linear stricture. The diaphragmatic stricture consists of a thickened fold of mucous membrane with a centrally- or laterally-placed iris-like opening, small or large. The crescentic or bridle stricture is that form in which the mucous fold juts from about one-half of the lumen of the canal, either laterally or on the upper or lower wall. By the term annular stricture a more or less complete ring, narrow or broad, of the stenosed urethral canal is understood. When the resulting narrowed tube to the extent of one or more inches is irregular in its course, the case is called one of tortuous stricture.

The terms soft and hard stricture, as we have already seen, are frequently used, with much significance, in describing the degree of density of the urethral infiltration present.

The So-called Inflammatory Stricture.—An inflamed or hyperæmic condition of the mucous membrane, usually of short duration, sometimes occurs at the affected part in stricture of the urethra. In such cases the patients are said to have inflammatory strictures. They simply have strictures of greater or less calibre, which, owing to various causes, such as alcoholic and sexual excesses, cold, horseback and bicycle riding, laborious work, and bodily strain, have for a time become impermeable by reason of the swelling of the mucous membrane. Such

PLATE IV.

COMPLICATIONS OF STRICTURE,
showing false passages, perirectal abscess, cystitis, and ulcers of the bladder.

accidental conditions should not be dignified by such a formidable name as inflammatory stricture.

In some cases of stricture, particularly when seated in the subpubic curve, as a result of the causes just mentioned, and sometimes from the intemperate use of exploratory instruments, the compressor urethræ muscle, with perhaps the external vesical sphincter, becomes the seat of spasm and renders the urethra for a time impermeable. This condition is paraded at great length by some writers under the title of spasmodic stricture. It is simply an ephemeral complication, and is in no sense whatever a morbid entity. It is more common in some patients than in others.

The So-called Spasmodic Stricture.—While performing catheterization upon irritable subjects it has occasionally been observed by nearly every surgeon that the instrument is grasped and temporarily held by the urethral walls, even when the canal is free from permanent obstruction. In this case the sound or catheter acts as a foreign body, and the irritation which it produces is followed by contraction of muscular fibres in accordance with the familiar laws of reflex action.

In other cases the eccentric irritation is caused by laceration, abrasion, or a wound of the lining membrane, such as may ensue from the rough use of a catheter or other surgical instrument. This, of itself, may excite spasm, or the same may be induced by contact of urine with the raw surface.

Striking examples of urethral spasm are also met with as the result of irritation about the rectum excited by the presence of a tape-worm, ascarides, hemorrhoids, fissure of the anus, fecal accumulation, or by operations upon this part, especially the ligature of piles and operations on the cord and testes.

Among other causes of spasm are the presence of a stone in the bladder or urethra; organic stricture of this canal; long retention of the urine; digestive derangements; exposure to sudden changes of temperature; and mental emotion.

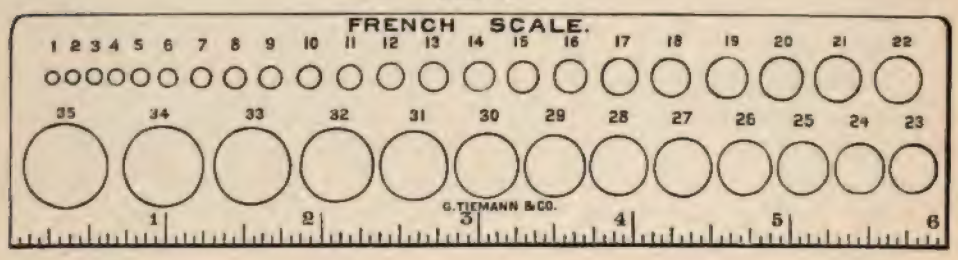
Instruments for the Exploration of the Urethra.—For the diagnosis of stricture we employ, in the main, bougies of various kinds which are flexible, and sounds which are made of solid metal.

For simplicity and precision in use these instruments are made in sizes which increase from small to quite large ones, and are graduated according to their diameters, which are clearly portrayed by certain scales used for measurement. The most extensively-used scale for urethral instruments is the French one, called the filière Charrière, which progresses by steps of one-third of a millimetre in diameter; thus, No. 1 represents an instrument one-third of a millimetre in diameter, No. 2, two-thirds, and No. 3, three-thirds, or one millimetre.

In this manner the scale progresses up to No. 30, which has a diameter of ten millimetres, there being a bougie for each number. Thus it will be seen that a bougie No. 6 French scale has a diameter of two millimetres, No. 9 of three millimetres, No. 12 of four, No. 18 of six, No. 24 of eight, and No. 30 of ten millimetres. The sizes of intermediate numbers can thus be readily computed (see Fig. 37).

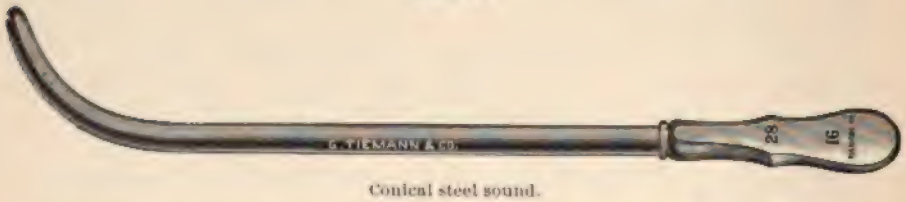
The English scale is used by many surgeons and includes sizes between Nos. 6 and 18.

Fig. 37.



Sounds.—These instruments are made of nickel-plated steel, and their surface should be so smooth that they will readily glide over the urethral walls. The best all-round instruments are those having what is known as the short curve at their distal portion. They should be conical at their point, which while being very round and smooth, is three sizes smaller than the shaft of the instrument. It is very desirable that the handle of the sound should be rather thin, tolerably light, and somewhat wedge-shaped. Fig. 38 gives a very clear idea of an exceedingly graceful and useful sound, which can be used with much delicacy of touch. Sounds with heavy, clumsy handles, insufficiently nickel-plated, dull of surface, and not very smooth should be avoided.

Fig. 38.



Conical steel sound.

As a rule, steel sounds are used in practice in numbers between 20 and 30 French. When an instrument is needed smaller than 20 F., it is well to use the olivary bougies. On the other hand, when an instrument larger than 20 or 21 F. is needed, it is better, in general, to use the steel sound.

A very useful and desirable sound is that known as Benequé's. (See

Fig. 39.) It has a long double curve, corresponding nearly to the two curves of the urethra when the penis is not elevated against the abdomen. It is really of the same shape that a flexible bougie assumes when introduced into the bladder and left to itself. Within certain restrictions and limitations, to be detailed later, this sound will be found of much

Fig. 39.

Benequé's sound.

service in a number of cases. It is only necessary to have about six of Benequé's sounds, beginning with 23 F., and ending with 30 or 32 F.

Straight steel sounds, of the sizes from 20 to 30 F., are sometimes very useful in cases of stricture in the pendulous urethra. (See p. 196, *et seq.*)

Olivary Bougies.—These bougies are so useful that the surgeon should always have a goodly supply at hand. Formerly French bougies were the best in use, but of late years excellent ones have been manufactured in this country. The olivary bougie is the one best fitted for general purposes, and the blunt ones are seldom used. In Fig. 40 is well shown

Fig. 40.

Flexible olivary bougie.

an ideal olivary bougie. The surgeon should exercise great care in the selection of these instruments, and should reject those that are in any way faulty. The following are the particular points of excellence necessary in these bougies: The whole instrument should have a smooth, shining surface, either black or yellow, and there should be no cracks whatever on it. The olivary point should be rounded and smooth, and should taper off gracefully into the neck, which should very gradually increase in size until the shaft is reached, as is well shown in Fig. 40. The neck should be very supple, and the whole instrument should be so flexible that on introduction it will easily and almost imperceptibly follow the course of the urethra without any discomfort to the patient. As a rule, the olivary end should be about seven sizes smaller than the shaft of the bougie, and the neck at the base of the olive point should have a diam-

eter of about one-half of that of the olivary expansion. When these requirements are fulfilled the instrument is quite gradually tapering, and will produce much benefit in the process of dilatation of the urethra. All bougies with imperfect olivary ends should be rejected. These seemingly minor points are worthy of much attention.

The surgeon should provide himself liberally with these instruments, having three or four at least of each size. The most useful sizes begin at No. 6 F. and end about No. 22 or 24 F. It will be found, as a rule, that bougies of sizes above No. 22 or 24 French are liable, even when great care is used in their introduction, owing to their quite large calibre and their comparatively thin and compressible walls, to become cracked or more or less broken from two to four inches from their distal portion. As a rule, therefore, these instruments may be used for dilatation or exploration in sizes as high as 20 to 24 French. Beyond these limits much better results will be obtained from the use of steel sounds.

These bougies should be kept (few in number) in compartments in which, in hot weather, powdered French chalk may be placed to prevent the gumming of opposing surfaces.

Filiform Bougies.—Very attenuated, delicate bougies, called filiforms, are of great service in the diagnosis and treatment of tight strictures. The two principal forms are the gum elastic and the whalebone bougies. French filiform bougies are very soft and flexible, and are of much use in cases where the stricture does not hug tightly. In examining tight strictures they soon become twisted and cracked, and then it is necessary to discard them. (See Fig. 41.)

For general use whalebone filiform bougies are most serviceable. These little exploratory instruments have, as a rule, a diameter of two-thirds of one millimetre, but some of them are of larger calibre. Of whalebone filiform bougies there are two kinds, the short and the long. The short bougies are about twelve inches long, while the long ones are twenty to twenty-five inches long. The short instruments are employed for purposes of diagnosis, while the long ones are used as conductors for sounds or catheters through strictured tissues.

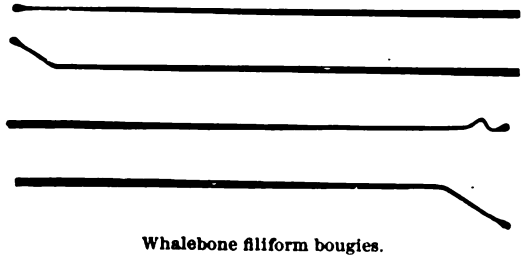
The shafts of these instruments should be perfectly smooth, and they should never be used until they have been carefully examined, for they, by use, are apt to chip and crack or become frayed. Their points are usually tapering, and they end in a minute bulb. These bougies may be straight or they may have eccentric and twisted points. By soaking them in hot water they can be twisted into any desired shape, spiral, zigzag, and bent at any angle. After soaking in hot water and bending them the shape may be made stable by plunging them into cold water.

Whalebone filiform bougies should be kept in tin cases to ensure them from the attacks of certain grubs or worms which destroy them.

As they grow old they may become brittle, consequently it is well to oil them occasionally.

Whalebone bougies with tapering filiform ends, increasing quite abruptly up to goodly-sized 10 to 13 F. shafts, are sometimes of very

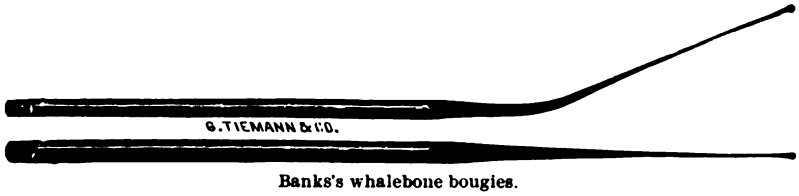
FIG. 41.



Whalebone filiform bougies.

great service in preparing the way for gradual dilatation, for a small retention catheter, or for the introduction of a staff for internal or external urethrotomy. These bougies are known as Banks's whalebone bougies. (See Fig. 42).

FIG. 42.



Banks's whalebone bougies.

What are known as Harrison's dilators or whips are often very useful for quite rapid dilatation at one sèance. These bougies are twenty-four inches long, and are straight for thirteen or fourteen inches, then they taper down gradually to the tip. They range in sizes between 10 and 20 French, and are very soft and supple. Six of them form a set, the smallest of which is filiform at its tip.

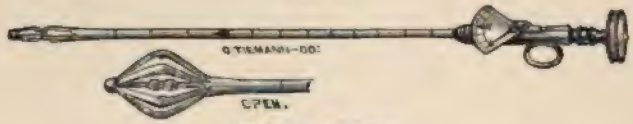
The French and English filiform bougies are generally armed with screw tips, which permit of their adjustment to catheters and to the staffs of urethrotomes, to which they serve as guides to the bladder. These bougies with screw tips are particularly frail at their point of junction, and as a result can scarcely ever be used more than once or twice. The English bougies are rather more brittle than the French ones, but when used carefully, owing to their stability, they traverse strictures with more uniform success than the French ones do.

BOUGIES A BOULE.—The acorn-pointed bougies, or *bougies à boule*, have already been spoken of. (See p. 86, Fig. 23). These instru-

ments are indispensable for the diagnosis of stricture, since they allow us to clearly detect and define hyperplastic and inflamed points and strictures in the anterior urethra. The soft, flexible *bougies à boule* should be the instruments of choice.

THE URETHRAMETER.—Since the meatus is usually the narrowest part of the urethra and varies very much in its calibre, it may not allow the introduction of any of the instruments thus far mentioned of sufficient size to thoroughly explore the canal and especially to detect contractions. An instrument which could be inserted through a narrow meatus and then be dilated within the urethra, with an index at its distal extremity showing the amount of its dilatation, was therefore a desideratum. This want has been supplied by the ingeniously contrived urethrameter of Dr. Otis (Fig. 43).

FIG. 43.



Otis's urethrameter

For cases in which the meatus is rather small this instrument may be of much service, provided its bulb is not screwed up beyond 30, or at most 31 F. Within these sharp limitations the instrument may be employed.

Instruments for Operation upon the Urethra.—For strictures near the meatus, the ordinary straight blunt bistoury will answer every purpose to the surgeon's satisfaction.

One of the most useful and simple instruments for tight strictures in the pendulous urethra is Fluhrer's modification of Maisonneuve's urethrotome. (See Fig. 44.) This consists of a staff or conductor nine and a half inches long, of a calibre of 12 F., grooved on its upper surface and slightly curved at its distal end, which is tunnelled for one-eighth of an inch. The triangular blade with a blunt apex is seated at the end of the

FIG. 44.

Maisonneuve-Fluhrer urethrotome.

stylet, and is provided with a handle. The whalebone guide having been passed down the urethra and into the bladder if possible, the grooved staff is slid over it as far as the penoscrotal angle, and then the knife is slowly and firmly pushed down, the penis being held straight and tense. By this urethrotome the urethra may be incised to 18 or 24 F.

For the moderate or limited incision of bands or broader coarctations

of the pendulous urethra, which will admit of instruments as large as 16 or 17 F., Civiale's urethrotome will sometimes prove very useful. This instrument has a terminal bulb in which the blade is concealed, but which can be readily drawn out by pressing on a spring near the handle. A glance at Fig. 45 will reveal its construction.

Fig. 45.

Civiale's urethrotome.

When used with great caution in a restricted number of very carefully selected cases, Otis's dilating urethrotome may be of service, particularly when there is a bona-fide stricture of a calibre of from 16 to 20 F. in the pendulous urethra. (See Fig. 46).

For certain cases of tight stricture in the urethra at the penoscrotal angle, and as far back as the bulbomembranous junction, Maisonneuve's urethrotome is sometimes very serviceable. This instrument is far superior to all other curved urethrotomes. Its use, however, is restricted to a certain class of cases. (See Fig. 47).

The manner of using this instrument is very simple. In most cases the filiform flexible conductor is first introduced as a guide, and the shaft of the instrument is then screwed upon it and made to follow it into the bladder. In many instances it is possible to introduce the shaft alone, armed with the blunt point which is always provided, when it is impossible to pass the conducting bougie. In either case, when the bladder is fairly entered, as may be recognized by the finger in the rectum, the penis is to be put upon the stretch, and the blade is carefully and gently, but firmly, thrust down to the extremity of the groove, dividing every obstruction before it. It is important to take care in withdrawing the blade lest it should cut healthy tissue. To this end the penis must be held tense, just as it was when the knife was pushed down (and the transverse folds were effaced). Then the instrument should be slowly drawn out, care being taken to keep exactly in the median line, which was traversed in the urethrotomy.

Preliminary Considerations in the Examination of Cases of Strictures.—Every case of stricture of the urethra presents features peculiar to itself, consequently each case should be carefully studied in all its details.

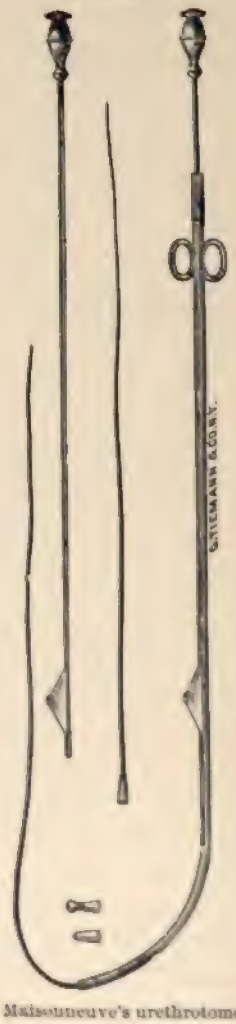
The first consideration is the age of the patient. If he is under thirty years of age, in the majority of cases the stricture will be found to be of the soft or semi-fibrous variety. In some cases—rare,

however, particularly when gonorrhœal infection has occurred long before puberty—the subject may suffer from true inodular stricture in early manhood. Beyond the age of thirty we find that strictures become more condensed and fibrous, while after forty, and particularly about the fiftieth year, the inodular or hard, fibrous stricture is quite common.

Fig. 46.

Otis's dilating urethrotome.

Fig. 47.



Maisonneuve's urethrotome.

Severe inodular stricture may be found in patients even as early as the thirtieth or thirty-fifth year.

The second point for consideration is the date of gonorrhœal infection. We must ascertain the age at which the disease was acquired and the facts as to the severity and length of the attack. Then the matter

of relapses and later infections should be taken up, and the facts concerning them brought out. The inquiry is still incomplete until all facts as to the condition of the posterior urethra, the prostate, and the seminal vesicles are ascertained, together with full particulars as to the condition of the bladder and its functions. The condition of the urine must be clearly ascertained as to the presence of threads, pus, blood, and the tissue-elements of the kidney.

As a rule, we do not find secondary kidney complications in cases of stricture until after the fortieth year. These complications are preceded by cystitis of varying grades, which may exist several or many years before the infective inflammatory process invades and creeps up the ureters and involves the pelvis and parenchyma of the kidneys. In all cases, and particularly in subjects over forty or fifty years of age, the condition of the bladder and kidneys is a very vital question in the matter of treatment of stricture of the urethra.

It is further necessary to take into consideration the general health of the patient, his habits, his temperament, his occupation, and his mode of life.

Coming down, now, to a consideration of the stricture itself, it is necessary to inform ourselves as to its symptoms, and particularly as to how much it interferes with urination. Then the frequency of the urinary act is to be considered. If there are any complications, such as fistulæ or rectal disorders, these must be borne in mind in forming an estimate of the case. As to the stricture itself, it is necessary to determine its location and its degree of contraction, together with the amount in length of the urethral canal which is damaged.

If the patient had at an earlier date been operated upon for stricture, all the facts relating to this operation and its results should be gathered, and due weight should be attached to them. Further than this, the length of time in which the stricture underwent recontraction is an important point.

Methods of Instrumental Examination.—It is a good rule to have the patient pass his water in the presence of the surgeon before he submits to examination. In the examination of the urethra for stricture it is always best, at first, to use an olivary bougie of about 20 or 22 F., which, after lubrication with pure white vaseline or lubrichondrint should be slowly introduced into the canal and passed downward until an obstruction is met. To my mind, this instrument, thus introduced, gives a better idea of the state of the canal as far as the stricture than any other, and this is the first condition to ascertain. When the stricture is not very tight, the olive point of the bougie may enter it as far as its expansion. Then on its withdrawal a small *bougie à boule*, 9 to 10 French or larger if indicated, may be carefully introduced, and if it

traverses the stricture without impediment, on its return the shoulder of the bulb will give very important information as to the amount of urethra which is the seat of coarctation, and to the condition as to firmness or succulence of the stricture-tissue. In practice, the *bougie à boule*, as a general rule, will give no precise information and will not adapt itself to ready use in sizes under 9 or 10 F. It may be difficult in many instances to introduce these small sizes. When strictures will admit larger sizes of this form of bougie than from 12 French upward, their use is generally productive of much important information.

When it is necessary to use large bulbous bougies, the meatus may sometimes be too small to admit them. If expedient in these cases, the meatus should be properly incised, but if for any reason meatotomy is at the time inadvisable, the urethrameter may be employed. With this instrument it is only necessary to determine the lessened calibre of the canal at the stricture, taking 30 or 32 F. as the standard and the maximum. There is no need of making measurements of the canal up to 35 or 40 F., since that amount of distention is utterly unnatural, and operations based on that assumed calibre are, as a general rule, productive of infinite harm to the patient. By means, therefore, of the olivary bougie, the *bougie à boule*, and exceptionally of the urethrameter, we can generally obtain scientific knowledge of the nature and extent of strictures of the urethra from 9 to 10 French upward.

Much useful information may be gained by careful palpation of the pendulous urethra, and of the canal nearly up to the bulb, by means of the finger-tips. This procedure will reveal little masses or rings of indurated tissue, and also localized spots where there is less than normal elasticity if they are present.

When the stenosis has reduced the canal to a calibre under 9 French, exploration should be made by means of correspondingly small olivary bougies or of filiform bougies.

Urethral examinations for stricture should be conducted with the utmost care, deliberation, gentleness, and good judgment. Our aim should be to cause the patient a minimum of uneasiness or pain, and not to distend the tissues any more than is absolutely necessary.

It is always an excellent rule to begin examinations with instruments of goodly size, and to use smaller and smaller ones as the condition of affairs indicates.

In strictures of calibre above 12 or 15 French there is usually no difficulty experienced in their exploration, and no preparatory treatment is, as a rule, necessary. In cases of tighter strictures more or less difficulty may be encountered.

In passing delicate olivary bougies and filiforms into the urethra much care and patience is required. The instrument should be well

lubricated, and then held between the finger and thumb in a delicate, easy manner. Steadying the penis with the left hand and everting the lips of the meatus with the thumb and fore-finger of the same hand, the operator passes the bougie, held with the right hand, gently into the urethra. As the mucous crypts and follicles are seated mostly on the upper wall, the instrument is pushed gently forward on the lower wall, and if it catches in a follicle it should be withdrawn slightly and then pushed or coaxed along again. In this way we, as a rule, avoid the lacuna magna and other valve-like pockets and the orifices of ducts of glands. When the instrument is down on the face of the stricture, the penis should be mildly put on the stretch and held at right angles to the body. Then the very slight forward and backward movement of the bougie may be begun, with the idea of getting into the mouth of the stricture. Sometimes when the penis is held in the horizontal position in conformity with the thighs, the bougie will slip in easily, whereas before that it did not pass.

In many cases the prompt introduction of a small olivary bougie or a filiform may be brought about by injecting into the urethra and there retaining about two drachms of pure olive oil or liquid vaseline. This injection distends and lubricates the canal, and often allows a filiform bougie to slip through the obstruction, which before seemed impassable.

It is always necessary to bear in mind the fact that the mouth of the stricture may be eccentric rather than, as the rule, centric. Therefore, it is well, after having failed with the ordinary straight filiforms, to try those which have various twists and curves at their ends, since by these we may most unexpectedly succeed when we had already perhaps given up hope of passing the stricture.

It is always well to have several Banks filiforms at hand, since they often prove very useful at unexpected contingencies.

In cases where much difficulty has been experienced, but where the passage of a filiform has been accomplished, this instrument may be tied in for several hours, and then a Banks filiform may be introduced, and by means of it such temporary dilatation may be accomplished that the subsequent treatment of the case is rendered materially less difficult and trying.

In some troublesome cases it is well to pass several (as many perhaps as six) filiforms as far down as the stricture, and then to inject the urethra with oil, after which the surgeon should try to pass each bougie individually. In this way he may often succeed, whereas before adopting this expedient he had failed utterly. In some very troublesome cases I have succeeded in getting through a stricture by first passing down to its face several filiforms, and then by means of a hard-rubber uterine syringe, introduced as far down as possible, injecting about two

drachms of very warm olive oil, and holding it in the canal well down by means of compression by the fingers. In this distended and lubricated condition of the urethral canal the orifice of the stricture is often so much dilated that it will allow the filiform to pass through.

There is another method of procedure which should never be forgotten. This, in the main, consists in the employment of a truncated catheter. A silver catheter (20 or 22 F.) is cut off at right angles to its shaft at the length of six inches. The cut end is then rendered round, smooth, and harmless by means of a thin ring of solder, which is evenly moulded around the distal end of its lumen. This catheter then becomes a very useful conductor. It is well oiled and passed down to the face of the stricture, and there held gently but quite firmly; then through it filiforms are passed and gently manipulated. In many cases, even when success is not hoped for, this procedure will result in the passage of the bougie.

Having succeeded in passing the filiform into the bladder, the sur-

Fig. 47.

Tunnelled sound (and guide).

geon can moderately dilate the canal by sliding over it one or more increasing sizes of the tunnelled sound. (See Fig. 48.) By this procedure (assuming that urethrotomy is not contemplated) the surgeon generally places the urethra in such a condition that it will be passable by instruments for a day or two at least. If, however, the operation of internal or external urethrotomy is indicated, and the time and conditions are favorable to its performance, the surgeon then has a clear field.

If, after prolonged efforts to reach the bladder, much uneasiness is produced and much hemorrhage occurs, and the instrument still does not pass, it is well to stop the examination and wait for a day or two.

In some cases, after one or more failures in introducing very small instruments through a stricture, it may be necessary to put the patient to bed, to allow him a very spare diet (bread and milk preferably), and to purge him well, in order to relieve the pelvic organs of congestion. As a result, strictures previously impassable will often allow the instrument to glide into the bladder. In many cases rest, an opium sup-

pository, and a hot bath will relieve the stricture of congestion, so as to allow the passage of the exploratory instrument.

For various reasons, more or less urgent, it is often necessary to pass sounds and catheters through the urethra into the bladder.

INTRODUCTION OF THE CATHETER OR SOUND.—A catheter or sound may be introduced while the patient is in the standing[1] or sitting posture, but the recumbent position is on many accounts the best, the patient lying square on the back, with the shoulders elevated, the knees drawn up and somewhat separated, the genital organs entirely exposed, and the surgeon standing on his left. The operator now raises the penis, which has been carefully washed, to an angle of about sixty degrees with the body, thereby effacing the anterior curve of the urethra, by means of the ring and middle finger of the left hand, its palm looking upward; the thumb and forefinger are thus left free to retract the prepuce and separate the lips of the meatus. The catheter or sound previously warmed and lubricated, is held lightly between the thumb and fore and middle fingers of the right hand "like a pen," its shaft corresponding to the fold between the abdomen and the left thigh. The introduction of the instrument should be slow and with the exercise of little force; its own weight is almost sufficient to effect its passage if properly directed; if any obstruction be met with, the instrument should be withdrawn for a short distance and again advanced with the direction of its point slightly varied. While passing through the first two inches of the urethra the point of the instrument is inclined to the lower surface in order to avoid the lacuna magna, and it is well to hug the lower wall until the end of the instrument has passed the penoscrotal angle; beyond this it should be directed rather to the upper surface to escape the sinus of the bulb; when it has penetrated beneath the pubes, the shaft is brought round to the median line of the body and parallel to the surface of the abdomen; the handle is now to be elevated to a perpendicular, and pressure being made with the disengaged hand upon the mons Veneris and the root of the penis for the purpose of stretching the suspensory ligament, be gently depressed between the thighs, not forgetting meanwhile to maintain a certain amount of progressive

[1] A method of passing the sound known as the *tour de maître* is much preferred by some surgeons. It is a very simple, easy, and expeditious procedure in the hands of men of large experience, but to the beginner it may prove a stumbling-block which will bring mortification to him and pain and discomfort to his patient. The surgeon sits, and the patient stands before him. The sound is introduced with its convexity facing the pubes as far down as the bulb; then the shaft is quite rapidly rotated toward the abdomen, when the point readily slips into the membranous urethra and the handle is depressed between the thighs. When skilfully done, this operation is unattended with any unpleasant symptoms whatever to patients, many of whom prefer it on account of its ease and celerity.

motion in the instrument, when the point will usually glide into the bladder. If any difficulty is met with at this stage of the proceeding, it is probably because the point has caught in the extensible tissue of the bulb, and the instrument should again be raised to a perpendicular

FIG. 49.

First step in introducing a catheter.

and slightly withdrawn, and the penis elongated by traction before the manœuvre is repeated. Further assistance may be obtained, if necessary, during the latter part of the introduction by gently pressing against the convexity of the instrument just back of the scrotum or by introducing a finger into the rectum, ascertaining the exact position of the point, and guiding it forward and upward against the posterior surface of the symphysis; the passage of the extremity over the verumontanum and uvula vesicæ is often indicated by nausea or a slight tremor on the part of the patient, and its entrance into the bladder by the flow of urine.

When dexterously and gently performed, the introduction of the sound or catheter is accomplished without a hitch or halt in most cases.

By want of gentleness and by bungling procedures spasmodic contraction of the involuntary muscle-fibres of the pendulous urethra may be induced, and also spasm of the compressor urethræ muscle. In this event it is well to desist or to press the tip of the instrument gently and continuously against the obstruction until spasm ceases, and then it will slowly glide onward.

FIG. 50.

Second step in introducing the catheter.

Treatment of Contractions and of Strictures at and just within the Meatus.—By a wise provision of Nature the end of the urethral canal is so much narrowed that the stream of urine is projected well in advance of the body and in a solid jet, in accordance with hydraulic principles. Exceptionally cases are met with in which there is a greater or less abnormal contraction of the meatus. When this is only moderate, there may be no disturbance in the function of urination; but in some cases the meatus is exceedingly small, even of a pinhead size, and then much functional disturbance may result. The prominent symptoms in cases of very small meatus are frequent, painful, and prolonged micturition and deep-seated urethral uneasiness or irritation, together with vesical irritability. In some seemingly well-observed cases such symptoms as anterior crural neuralgia and sciatica have been found. Many incorrect and exaggerated statements have been made as to the serious conditions which often accompany contracted meatus. Thus it is stated that the anomaly gives rise to pain in the back and hypogastrium, groins, and testes, to hydrocele, to painful seminal emissions, and to paresis and softening of the brain. The truth of the matter is about as follows: In men free from gonorrhœa or urethral irritation the urinary functions may be perfectly performed even if the meatus is no larger in calibre than 10 French, and there may be no abnormal symptoms.

The logical deductions warranted by the foregoing facts and considerations are—1, that when an abnormally small meatus causes a decided impairment of the urinary function, it should be cut in a conservative manner; 2, that when the smallness of the urethral orifice is found to be the undoubted cause of the perpetuation of deep urethral inflammation of any kind, it should be enlarged; and, 3, that when the meatus will not admit of instruments sufficiently large to act upon deep-seated urethral lesions, it should be incised in keeping with the necessity.

In general, the contraction of the meatus is due to the excessive development of the mucous membrane at the lower commissure, and exceptionally a septum of mucous membrane stretches across the canal from the upper commissure and encroaches more or less on its lumen. Consequently, it is necessary to examine each case by separating the lips and also introducing a curved probe in order to determine whether the incision is to be made upward or downward. The part having been rendered aseptic, an incision should be very carefully made exactly in the middle line by means of a straight blunt bistoury. It is well, as a general rule, in this operation of meatotomy, to make the incision large enough to admit a 32 F. meatus sound, supposing that the urethra will comfortably admit a No. 30 F. sound. If the urethral lumen is less than 30 F., it is well to cut the meatus in accordance with its measurement. In the majority of cases it will be found that when the meatus finally heals the calibre will be about two sizes smaller than the meatotomy made it. After incision of the meatus pressure will usually stop bleeding in a short time. The meatus sound (there are varying sizes of this useful little instrument) may be introduced every two or three days for several weeks. It is thus necessary to keep up the process of dilatation, since these parts show a decided tendency to promptly recontract.

Cicatricial strictures of the meatus are not very common, and in general follow the initial lesion of syphilis when seated here. In many cases of chancre of the meatus the urethral lumen is not at all impaired after its involution; in others there may be slight contraction, and exceptionally a dense fibrous ring is left, which may reduce the size of the orifice to No. 2 or 3 French scale.

Chancroidal ulcers, and exceptionally chronic relapsing herpes progenitalis, may cause cicatricial stricture of this orifice. A sclerodermatous condition and keloid may also cause abnormal contraction of the meatus and fossa navicularis. In these cases of stricture due to new tissue-formation the incision should be made in accordance with the seat of the obstruction. The passage of a probe will show whether (as is generally the case) it is necessary to make an upward and also a down-

ward incision, and it will indicate the necessary depth of the cuts. The subsequent treatment consists in the careful introduction of the meatus sound. This operation should be repeated for a considerable time, sometimes many months, until all tendency (which is great) to recontraction has ceased. If, as a result of this operation, the meatus will admit a No. 30 French sound, it may be pronounced to be satisfactory.

Treatment of Stricture in the Pendulous Portion of the Urethra.—The urethra from the penoscrotal angle to the meatus, corresponding to Regions Nos. 2 and 3, is in many cases the seat of stricture, but it is rather less frequently affected than the first region, which includes the bulbous portion of the canal.

In the pendulous urethra, which extends to the penoscrotal angle, many changes take place as the result of gonorrhœal inflammation which should be separately considered.

For purposes of description it is well to study urethral contractions, inch by inch, down the canal, since the surgical indications and requirements vary very much in different portions of the anterior canal.

In chronic gonorrhœa the two inches of the urethra just beyond the meatus may be the seat of soft infiltration, which is thus limited or which may be continuous with a morbid condition of the urethra beyond. In practice we not uncommonly find strictures of this part. They may be met with in the semifibrous or well-developed fibrous form. Inodular stricture is rarely found here.

Semifibrous strictures of the segment of the urethra under consideration may be much benefited by dilatation with the straight steel sound, provided they are seen early enough. As a rule, however, these cases come to us when the urethral canal is the seat of fibrous infiltration, which further shows itself by the existence of one, several, or many ring-like bands. The canal is then the seat of fibrous stricture, which in this region is usually very dense and unyielding. The calibre may be 15 to 3 or 4 French scale, and the bulb introduced and withdrawn bumps roughly over a dense membrane with contractions. It may be stated as a general rule that in these cases dilatation is not to be used, since it will produce little if any effect, and will cause pain and uneasiness.

These strictures require careful incision, for which purpose Gouley's probe-pointed bistoury and the straight blunt bistoury are the necessary instruments. The parts having been thoroughly cleansed, cocaine anæsthesia may be produced by the injection into the urethra of a 10 per cent. solution. If the contraction is very small, the canal may be widened sufficiently by a moderately downward cut with the Gouley knife, and then an upward and a downward cut exactly in the median line should be made with the blunt bistoury. These parts never should be cut recklessly, either into the space between the cavernous bodies

above or into the cellular tissue below. If after this simple form of internal urethrotomy a No. 25 to 28 F. straight steel sound can be introduced readily and without pain to the patient, the result may be considered good. In these cases it is utterly impossible to fully restore the suppleness of the urethral walls, but much can be done by careful dilatation kept up long after the incisions. Stricture-tissue in this portion of the urethra is very prone to rapid condensation and contraction; hence there is always a battle in these cases to keep the urethral canal of moderately large size. Though some authors recommend over-dilatation and a general vigorous treatment for these distal strictures, I am firm in the conviction that moderate and gradual dilatation up to 25 F., and perhaps a little above, will in the end give the patient the best results. In cases of large urethra perhaps we may establish a calibre of 30 F. This however, may be said, that if five years after this little operation the patient can pass a No. 25 F. sound, he is a lucky man.

We sometimes meet cases in which the contraction is from one to two inches down the canal, and a 15 French bulb passes readily beyond it. For these cases Civiale's urethrotome is particularly adapted. Localizing the fibrous patch or band by means of the expanded portion of the instrument, the penis is rendered tense and the tissue is cut on the upper wall of the urethra to about 28 or 30 F. Then the straight steel sound may be passed, and while it is in the canal moderate pressure may be exerted on the morbid tissue. By this means considerable absorption may be produced.

The So-called Strictures of Large Calibre.

Some authors claim that the normal urethral calibre is much greater than that given in this work. They base their statements on the fact that the urethra may be dilated by the urethrameter up even as high as 40 F. They further make the claim that the calibre of the urethra is or should be uniform in its whole course; consequently if a urethrameter is introduced into a canal and screwed up to, say 36 F., according to these views this expanded bulb should pass smoothly out when the instrument is withdrawn. If, however, the instrument hitches or halts or jumps over moderate obstructions, these narrowed parts are called strictures, and the patient is told that he has one or more strictures of large calibre. The trouble with this matter of strictures of large calibre is that the assumptions regarding them are based on conclusions drawn from the use of the urethrameter, and on theories as to the nature of stricture of the urethra. This whole subject is cleared up by a full knowledge of the arrangement of the muscular fibres of the urethra.

The facts are as follows: Outside of the mucous layer of the urethra are two muscular layers which extend from the vesical orifice to the meatus, being particularly strong and thick in the prostatic urethra. The outer muscular layer consists of fibres forming distinct rings, while the inner muscular layer consists of longitudinal fibres. When the penis is in a flaccid condition these muscular fibres lie rather near together, but when it is erect, and when the urethra is much distended, they are stretched apart. The longitudinal muscular fibres in the torpid condition of the penis contract mildly and shorten the urethral canal, and throw it into transverse folds, while the ringed fibres bring the walls into such a collapsed condition that the urethra is converted into a long thin slit. Now, when the urethra is, in the dead subject, injected with some hardening fluid, and the canal is then dissected out, it presents the appearance shown in Fig. 51. It will be seen that the

FIG. 51.

Shows a normal urethra distended with solidifying injection-material. The contractions correspond to the circular rings of muscular fibres.

canal is both elongated and much distended, and that at quite regular intervals there are certain depressions which show decided contractions (about eleven in number) in its continuity. Now, these constrictions are caused by the resistance of the muscular rings, which are forced widely apart and put on the stretch. Between these muscular rings the dilated portions consist of mucous membrane and its ambient fibrous tissue. Now, when we apply these anatomical facts to clinical observation and instrumental examination, many points which have until now been obscure are rendered clear. These muscular rings will allow of very considerable stretching by the urethrameter, but they finally offer resistance, while the tissues between them, being less firm and more extensible, yield, and as the bulb of the instrument is drawn out it is held by a muscular band on its proximal end, and this contraction is then, by many, pronounced to be stricture. Consequently, I say that surgeons imbued with the belief that the normal calibre of the urethra is much above 30 F., and that the lumen of the canal in health is unvaryingly uniform in calibre, can find strictures in the urethra

of any man if they will only expand the bulb of the instrument strongly enough.

Undoubtedly cases do occur in which true strictures of large calibre exist, but they are rather rare. In Fig. 52 is clearly portrayed a thread-like semifibrous stricture which was seated in the urethral wall three inches down on its lateral portion, extending nearly but not up to the median line. Now, this is a fair

Fig. 53.

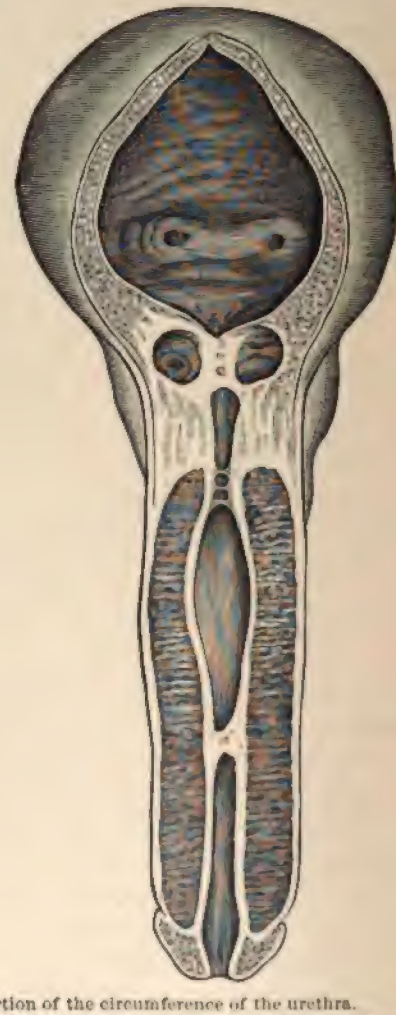


Fig. 52.

Fig. 52.—Thread-like stricture involving only a portion of the circumference of the urethra.
Fig. 53.—Showing firm fibrous stricture in the middle of the pendulous urethra, dilatation of the canal behind it, inodular stricture at the bulb, abscess of the prostate, hypertrophy of the bladder, and dilatation of orifices of the ureters. (From the Museum of the College of Physicians and Surgeons, New York.)

representation of strictures of large calibre. This one formed only the segment of a circle, and more extensive ones form more or less perfect rings. It will be seen that if the surgeon had attempted to incise this stricture by means of the dilating urethrotome, it would have escaped the

cutting blade, which follows the median line almost exactly. This occurrence, therefore, is very significant, and points out the necessity of thorough examination in all cases. When the bulb of the *bougie à boule* was slipped over this contraction, the sensation was conveyed as if it was held by a distinct band or ring. The same sensation is conveyed when only a segment of the urethral ring is thickened from hyperplasia; and in many cases, if the diagnosis is thus wholly based on the finding of the *bougie à boule*, the conclusion may be reached that an annular stricture is present, when really only a portion of the urethral lumen is thickened and less distensible than it is normally. Consequently, it is necessary to carefully palpate the urethra with the finger-tip over the shaft of the bougie in the canal in order to discover areas of new tissue, and in some cases to examine the urethra with the endoscope. Before making a diagnosis of stricture of large calibre the surgeon must convince himself beyond all doubt that the contraction is there, that it is not due to localized soft inflammatory deposits, and that by his instrument he can reach and incise it.

Assuming that a stricture or strictures in ring or band form have been found, the surgeon has at his command—1, Civiale's urethrotome, which with practice becomes a very efficient instrument, and by which the constriction can be very accurately cut; and 2, Otis's dilating urethrotome, which when judiciously used will cut with much accuracy and without damage to the urethra beyond the strictured part.

Tight semifibrous and fibrous strictures are not infrequently found in the pendulous urethra. In Fig. 53 is very clearly shown a firm stricture about three inches from the meatus. This figure is worthy of study, and the following points may be noted: The urethra behind the stricture is dilated and its wall thinned; at the bulb are several bands and much sclerosis of the mucous membrane; at the prostate there is an abscess, and the bladder-walls are much thickened. It is not uncommon to find a single anterior stricture like the one here pictured, but I think it is more common to find the pendulous urethra the seat of extensive (as to length) coarctation, in which there may be several, even many, bands. In these cases the urethral canal anterior to the penoscrotal angle is densely infiltrated, and these bands are simply the more prominent evidences of the morbid process.

In the **treatment** of these strictures in the anterior urethra much judgment and skill must be exercised. It is always well not to do too much in these cases. When the stricture-tissue is quite firm, we never can restore the urethra to its normal condition. Our function in these cases is to tunnel a moderately large passage, and then to try to keep it open. For these cases there is no more useful instrument at hand than Fluhrer's modification of Maisonneuve's urethrotome, using the blade

which will cut a passage for a 22 sound or bougie. When this operation is performed the treatment may be said to have just begun. Thereafter the sound must be regularly introduced about once a week or less frequently. If in these cases the patient is left with a canal which will admit a 20 or 23 F. sound, and his bladder is healthy, the result may be pronounced very satisfactory. Some surgeons recommend over-dilatation, sometimes applied with much force, in these cases; but, as a rule, such measures only stimulate the process of recontraction, and they should not be used. With the dilatation treatment subsequent to incision medication may be, if necessary, applied to the posterior urethra and bladder, and indeed to any complication which may exist.

In these cases the bulbous urethra may also be involved, and it will require suitable treatment.

Treatment of Strictures beyond the Penoscrotal Angle.—By far the greater number of strictures will be found just beyond the penoscrotal angle, as far back as the bulbomembranous junction. In treating this deeply-seated region it is a golden rule only to use the knife as a last resort.

In the chapter on Chronic Urethritis directions are given (see pp. 80, *et seq.*) for the treatment of the lesions of the anterior urethra, which should be remembered.

Strictures of the bulbous portion of the urethra may be soft, semifibrous, and inodular, all of which require appropriate treatment.

Soft and semifibrous strictures should, as a rule, never be incised until milder means have been tried and have failed.

The diagnosis having been carefully made, the calibre of the stricture is to be determined. Now, on this point no rule can be laid down, since cases differ so strikingly. Thus in some patients the canal may be reduced to 20 or 15 F., and yet these strictures are of the soft variety. In others, with similar calibres, they may be semifibrous or fibrous. Then, again, it is not very uncommon to find a urethra reduced even to 6 or 8 F. by an exudative hyperplasia which we call soft stricture. These various and varying conditions have to be ascertained, and as the surgeon grows in experience he will become more and more expert in recognizing them.

Gradual Dilatation.—When the stricture in the bulbous urethra is yet in the soft, or even in the semifibrous stage, the aim should be to remove as far as possible the cell-infiltration, and to thus, in a manner, restore the mucous membrane to its natural condition. This can be done in many cases by careful and gradual dilatation.

Seeing that a soft stricture may contract the urethral lumen even as low as 7 or 8 F., and that in many cases where the calibre is 15 or 20 F. the infiltration is yet soft and succulent, it is always well to make the

attempt to cure by the introduction of the bougie or sound before the knife is resorted to. When, however, a fibrous or inodular stricture of small calibre is discovered, our chief thought is not toward gradual dilatation.

I have in so many instances been able to restore the urethra, even when contracted to 7 or 8, to 30 F. that I am always loth to operate more radically.

In the process of gradual dilatation much care, patience, and good judgment are necessary. The operation should always be carefully and slowly performed in a manner to cause no pain or uneasiness and no damage to the tissues. By the pressure and stimulation of the distending instrument we hope to cause the absorption of the exudation and to give tone and resiliency to the dilated vessels. It will thus be seen that we are always liable to cause inflammation, and this condition will either delay the cure or perhaps thwart our efforts. In cases where the contraction is as great as 7 or 8 F., and also where the calibre of the stricture is much larger, there may be posterior urethritis or even urethrocystitis, and these conditions should receive proper treatment.

Beginning with a small olivary bougie, the surgeon should gradually and slowly increase the size of the instrument as the progress of the case will indicate to him. In the early part of the treatment the bougie may be introduced once a week, and then in favorable conditions the interval may be fixed at about five days. It is almost always well to allow this interval of time to elapse between the séances of treatment. Many men have failed in this method of treating stricture by the too frequent introduction of the instrument, and many patients have not received the benefit they would have if there had been less haste. In gradual dilatation, particularly in the early stages, the sensations of the patient should be carefully considered, and the urine regularly and methodically examined. If the operation causes uneasiness and pain in the perineum and over the pubes and continued frequency in urination, and if the parts resist the gradual increase in the size of the instrument, it will be necessary to suspend the treatment temporarily, and perhaps permanently. In many of these cases local medication to the anterior and posterior urethra will put the parts in such a condition that gradual dilatation may again be resumed.

It will be generally found, when dilatation is commenced, in the form of stricture under consideration, with very small olivary bougies, that at first the sizes may be increased quite regularly, and no trouble, or perhaps very little, is experienced by the surgeon until he gets up as high as 20 or 22 F. Then he will generally find that the dilating process will go on much more slowly, and that it may be necessary to introduce sounds of one size several times before larger ones can be used.

When in the course of this treatment the urethra will admit an olivary bougie of a size about No. 20 F., it is well to resort to the curved steel sounds and with them finish the cure. In many cases when the coarctation is extensive and involves the whole length of the bulbous urethra, the Benequé sound will produce particularly good results. Its double curve seems to exert a beneficial pressure not obtainable by the use of the ordinary curved sound.

When the sound causes inflammatory reaction, its use should be discontinued until appropriate treatment removes the tendency thereto, as it will in most cases. Exceptionally, however, it happens that the resulting inflammation is so great and so constant that it is necessary to wholly abandon this form of treatment. In many such cases judicious topical urethral medication after a time brings about such a change that the sound may be used again. In some severe and exceptional cases the expediency of external urethrotomy will suggest itself to the mind of the surgeon.

There is one point which deserves especial emphasis, and it is this: To produce lasting and permanent results by gradual dilatation the urethral canal must be brought up to the calibre of 30 or perhaps 32 F., and when this is attained the dilating process must be continued for some time, until these large sounds pass easily and without any grasping.

It is impossible to exactly state the period of time necessary for gradual dilatation, since it varies in each case and much depends on the regularity of attendance of the patient. In some cases the normal urethral lumen may be restored in three months, and in others in six, nine, and twelve months. As a general rule, a six-months' treatment will be followed with better results than a shorter course.

In the majority of cases the process of cure by gradual dilatation is uneventful, but in a small minority certain complications may arise and give more or less trouble. These complications are—1, fever and chills; 2, urethritis and urethrocystitis; 3, a tendency to hemorrhage; 4, temporary retention; 5, rheumatism; and 6, pyæmic abscess. It is well to state in advance that since the beginning of the era of asepsis and antisepsis in surgery these complications occur much less frequently than formerly and they are much less severe.

The occurrence of chills and fever shows that there is a low grade of suppuration in the deep urethra, but it need not cause the permanent discontinuance of dilatation. Such cases should be treated on the lines laid down for chronic anterior and posterior urethritis and urethrocystitis.

In like manner, the tendency to slight oozing of blood after dilatation can generally be checked by the instillation of a few drops of a solution of nitrate of silver (1 : 125).

When in the course of gradual dilatation retention of urine occurs once or at intervals, it is perfectly certain that one or two causes are at work: these are swelling of the mucous membrane in and near the stricture and temporary spasm of the compressor urethræ muscle. In such cases there is need of topical urethral medication, and the intervals between the passage of the bougies or sounds should be materially lengthened. When carefully managed this complication may be overcome.

The very rare occurrence of rheumatism and of pyæmic abscesses indicates very clearly that, besides the stricture-process, a decided suppuration of the urethra also exists, which can be cured by the means described in the section on the treatment of chronic anterior and posterior urethritis.

The main, and indeed the only, valid objection to gradual dilatation is that it is a slow process and occupies quite a long stretch of time. But it must always be remembered that if it is followed up until the urethra is restored to a calibre of 30 F., in the majority of cases it will only be necessary to have sounds introduced once or twice a year thereafter; whereas it can be said, without fear of contradiction, that when a man's urethra has once been cut he has (if he would keep the channel open) to pass instruments at short intervals all his life.

CONTINUOUS DILATATION.—Continuous dilatation is very rarely resorted to at the present time. In some cases where a filiform has after a long struggle been passed through the stricture, it may be retained there for some hours or perhaps for a day, in order to render certain the passage of a larger instrument.

Strictures at and just beyond the penoscrotal angle are frequently formed of the dense fibrous variety. These strictures sometimes under treatment become tolerably well dilated, and then they recontract more or less promptly; hence they are called "resilient strictures."

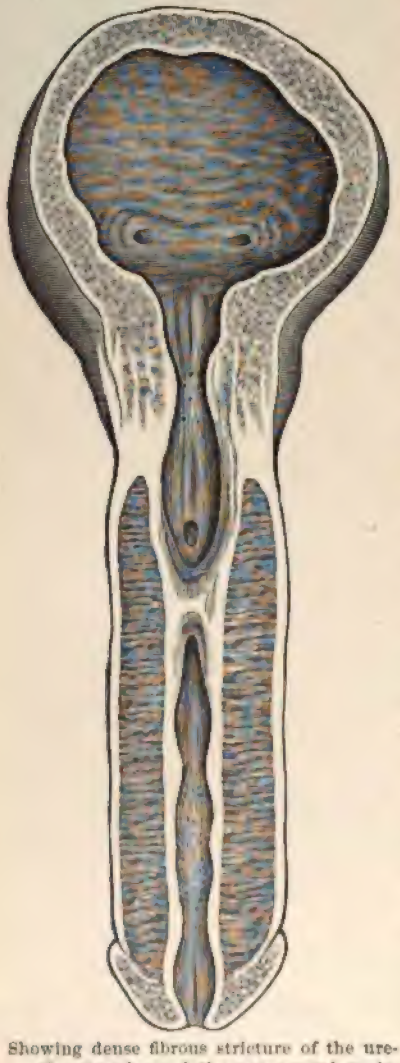
RAPID DILATATION is sometimes necessary, and is readily accomplished by passing over a filiform introduced into the bladder tunnelled sounds in increasing number until a calibre of 10 to 15 F. is reached

In marked contradistinction to the curability of the soft and semi-fibrous strictures beyond the penoscrotal angle are the fibrous and inodular undilatable strictures of this region, which for relief require the radical operations of internal or external urethrotomy.

INTERNAL URETHROTOMY in the deep urethra may be performed with certain restrictions in a limited number of cases. This procedure may be resorted to in cases of tight, not extensive, decidedly annular, fibrous stricture just at and about one inch beyond the penoscrotal junction, and perhaps at the bulbomembranous junction, particularly if the stricture is not a very large, dense, and inodular one.

Fig. 54 gives a very clear idea of a severe case of tight stricture just beyond the penoscrotal angle, with involvement of the greater portion of the pendulous urethra. It is evident that in such a case dilatation by sounds would be painful and futile, and that the only procedure advisable would be to tunnel a channel by means of a cutting instrument. The oval black spot just behind the stricture shows the distal end of a false passage.

Fig. 54.



Showing dense fibrous stricture of the urethra just beyond the penoscrotal angle, with dilatation of the bulbous, membranous, and prostatic urethra. The pendulous urethra is also much thickened and infiltrated. Walls of bladder much hypertrophied, orifices of ureters dilated. (From the Museum of the College of Physicians and Surgeons, New York.)

In former years internal urethrotomy by means of Maisonneuve's instrument was largely performed in cases of stricture in Region No. 1. My experience has taught me to limit its use to the fibrous strictures in the segment of the urethra just named. The patient, being healthy, having normal kidneys, and not much if any bladder trouble, should be put on moderate diet for a day or two and kept in bed, during which time the urethra, and if possible the bladder, should be well irrigated several times with quite hot saturated boric or salt solution. The night before the operation he should have a brisk cathartic. When antisepsis can be practised there is no need for the internal use of boric acid, salol, or quinine; still, there are no objections to the employment of these drugs if the surgeon so wishes. If the patient is a weakly man, he should be prepared some time ahead, by care as to diet and tonics, for the operation.

The patient is prepared, etherized, and placed on his back, then the filiform guide of the Maisonneuve instrument should be passed according to directions already given, and followed by the grooved conductor and the knife. Before every internal urethrotomy, just at the time of

use, the surgeon should pass the cutting part of the instrument down the grooved conductor, in order to be absolutely certain that there will be no impediment. If the soft French filiform should kink or curl up and come back, the surgeon should screw on the eyed or tunnelled tip. Then, having passed a long whalebone filiform, he should slip the eye of the conductor over this guide, and then cause the instrument to glide slowly into the bladder. Always before adjusting the cutting blade of the instrument, which is directed toward the roof of the urethra in the median line, the surgeon should put his finger in the rectum, when, if everything is all right, he will feel the conducting staff in the membranous urethra, and the end of the instrument can then be freely moved in the vesical cavity. When the urethrotomy is performed the instrument should be held in the line of the thighs. It is never well to use a large cutting blade. Too deep incisions may be followed by hemorrhage and perhaps urinary infiltration and fever. My custom for years has been to cut the urethra to the extent of 21 F., and on the withdrawal of the urethrotome to pass an olivary bougie catheter, No. 21 F., with a very small opening on its extreme end (not the ordinary gum-elastic catheter, whose eyes irritate and tear the urethra), into the bladder, and to allow any contained urine to run out, and then, by means of a hand syringe, to inject five to eight ounces of warm boric solution, and there leave it. This antiseptic solution, when voided later on, thoroughly bathes the wound and is productive of much good.

The bougie-catheter may be introduced again in about two or four days, and then the bladder should be injected again. With the urethra thus enlarged gradual dilatation may soon be commenced, and should be carried on until a calibre of 30 F. is produced. After that it is well to introduce the sound at intervals of a week, a fortnight, or a month, and perhaps several months, as the progress of the case indicates.

Internal urethrotomy thus performed in appropriate cases will not be attended with suffering or disaster to the patient, and will, if properly followed up, be productive of great benefit.

Since there is much confusion as to the title and scope of the various operations in the perineum for stricture and other conditions, it is well to try to present a sharply-marked division of them. These operations may be divided as follows: 1, external urethrotomy with a tunnelled sound for bladder drainage, etc.; 2, external urethrotomy with filiform guide through the stricture, down to the face of which or beyond a tunnelled instrument has been passed (this is the Gouley operation); 3, external urethrotomy with the staff passed down to the stricture without a guide through it (this is the Wheelhouse operation); 4, external urethrotomy without any instrument in the urethra, the membranous portion being incised (this is generally known as Cock's operation or perineal section).

External Urethrotomy for Drainage, etc.—This operation is, as a rule, very simple in its performance, since there is usually no impediment to the passage of the sound. The patient having been prepared and etherized and placed in the lithotomy position, the sound is passed into the bladder. The scrotum is held up by an assistant, who also holds the sound and causes its grooved convexity to bulge out the perineal tissues. The surgeon then with a scalpel carefully incises, to the extent of two inches, layer after layer until the urethra is reached and opened longitudinally about three-fifths of an inch or an inch. Then the bladder may be washed out, and a large catheter or perineal tube inserted and retained. This operation is also performed for the removal of calculi lodged in the membranous or prostatic urethra and of prostatic concretions, and for the digital exploration of these parts, the vesical orifice, and adjacent tissue. By the older surgeons this operation was called the "boutonnière."

Gouley's and Wheelhouse's operations are generally performed for the relief of insular strictures near and at the bulbomembranous junction, and less frequently for fibrous strictures the result of traumatism, or soon or immediately after the damaging or rupture of the urethra from accidents which lacerate or cut through the bulbous or membranous portions of the urethra.

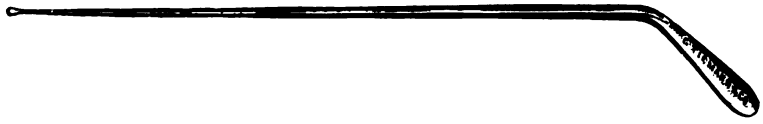
External Urethrotomy with a Guide.—*Gouley's Operation.*—The operating table must be in front of a window admitting plenty of of light.

The patient should be prepared, etherized, and placed in the lithotomy position. Before commencing the operation the surgeon, seated on a low stool, examines with his finger in the rectum, the membranous urethra and the prostate, and familiarizes himself with their condition.

The long filiform having passed through the stricture into the bladder, the tunnelled sound (see Fig. 48) is carefully slipped over it, and by it guided down to the face of the stricture. An assistant now carefully and firmly holds the end of the sound between the thumb and the forefinger exactly in the median line and a few inches above the pubes and hypogastrium, while at the same time he elevates the scrotum and preserves the vertical direction of the perineal raphé. If the urethra is not too deep, and if the perineum is not too much thickened with inflammatory exudation, the assistant may, by gentle upward pressure on the sound by means of his middle finger underneath it, make the tissues tense, and by this means clearer indications are given to the surgeon as to the precise position of the sound and the urethra. The surgeon then makes an incision, leisurely dividing layer after layer of the tissues in the median line from the base of the scrotum to within an inch of the anus, being about two or three inches in length and involv-

ing only the skin and superficial fascia. The dissection having been carefully carried down to the urethra, the surgeon feels for the groove in the curved portion of the sound with his finger-nail. He then enters the urethra, his knife being held at right angles, and cuts slowly and carefully downward about an inch, meanwhile taking care that the filiform guide is not cut. It is very important to make a good clean cut into the urethra by a continuous stroke, the knife not being withdrawn until the full incision is made, otherwise the canal may be cut in several places. Hemorrhage is usually moderate, and is readily controlled by clamps. When the urethra is opened a ligature two feet long is passed through each cut edge, and then tied at the end. Thus we have two retractors, which are held with gentle tension by two assistants, which take up no space in the wound and which allow full inspection of the field of operation. At this time the sound is withdrawn a little, so as to bring into view the black guide, alongside of which the small grooved probe, which should be gently curved upward toward its tip in accordance with the terminal half of the subpubic curve, should be passed

FIG. 55.



Arnott's small grooved silver probe with a broad handle, which can be bent to any angle.

into the bladder. (See Fig. 55.) Then in this groove Gouley's beaked bistoury is passed, and the stricture is incised on its upper wall, care being taken to go well through the dense stricture-tissue, but not into the connective tissue beyond. The probe is now turned so that its groove looks downward, along which the beaked bistoury is again passed, and the lower wall of the stricture is carefully incised (usually a little less deeply than the upper wall). (See Fig. 56.)

It is always well to take care, when the urethra is opened and the parts are exposed, not to let the guide slip out or to withdraw it until the grooved probe is well in the bladder and the incision of the upper wall

FIG. 56.

Gouley's beaked bistoury.

of the stricture has been made. Then the surgeon is master of the situation, and the guide may be withdrawn. In some cases the stricture-tissues are so densely fibrous and extensive that after a preliminary

slight cut with the beaked bistoury the operation may be completed more satisfactorily by means of a blunt straight bistoury.

When the stricture-tissue has been incised Teale's probe gorget is an exceedingly useful instrument, particularly to persons not very familiar with the operation. (See Fig. 57.) By its passage the parts may be

Fig. 57.

Teale's probe gorget.

much dilated, and by this means much aid is given the timorous surgeon who fears to cut too deeply. By means of the probe gorget the catheter or perineal tube is then passed into the bladder, which should be well irrigated with hot boric acid or salt solution.

The catheter or perineal tube used in this operation should be quite large, and should be adapted to the calibre of the incised canal. As a rule, tubes from 30 to 35 F. should be introduced. The aim of the surgeon now is to allow the urethral tissues and the ambient tissues, which have previously been much congested, to drain, and also to so act upon the urethra by as much dilatation as possible that absorption may be produced and a canal with a satisfactory lumen shall be left. To this end I always, if possible, allow the tube to remain in the wound three to seven days, taking care that the bladder is well irrigated several times daily, and applying such topical treatment as may be necessary. The tube is retained in the wound by means of a ligature which passes through its edges and the wound around the tube is carefully packed with iodoform gauze, over which are placed layers of absorbent cotton and gauze, which are held in place by a retentive bandage. The catheter is connected by means of a glass coupling to a long India-rubber tube (calibre 30 F.), which passes to a large bottle suspended to the side of the bed, which should always be half filled with 1 : 20 carbolic-acid solution.

During the progress of the case it is most important that the perineal wound should be carefully inspected and kept in a healthy condition. If indolent granulations appear they should at once be cauterized with the solid stick of nitrate of silver.

Now-a-days, with our more perfected technic and antiseptic measures, it is very rare to see any bad results follow external urethrotomy.

There may be a very slight and ephemeral rise in temperature, but only in very bad old cases with vesical and renal complications do we see urinary fever and sepsis; and these complications are much rarer than they were in former days. Hemorrhage is, as a rule, infrequent after this operation, as performed now-a-days, and is readily controlled by the pressure exerted by packing the wound quite tightly.

SYME'S OPERATION.—What is known as Syme's operation is practically the one already described, except that the instrument used in the urethra is Syme's staff. This instrument is grooved for half an inch at the distal part of its straight portion which is joined by the curved part, which is also grooved. This curved portion at its commencement is of size No. 8 F., and at its tip it is 4 French in calibre. This, long, thin curve makes the instrument very difficult to properly introduce into very tight strictures, even in skilled hands, and it has been known to cause death by making false passages. So, while it is well to be familiar with Syme's staff on account of its history, it is not well to employ it now that we have the tunnelled catheters and filiforms.

EXTERNAL URETHROTOMY WITHOUT A GUIDE THROUGH THE STRICTURE.—*Wheelhouse's Operation.*—When the patient is fully prepared and etherized a last attempt should be made to pass a filiform. This failing we operate without the aid of a guide.

FIG. 58.

Wheelhouse's staff.

The steps in the operation are as follows: The patient being in the lithotomy position the Wheelhouse staff is gently introduced down to the stricture with the groove looking toward the surface and is there held by an assistant. (See Fig. 58.) The surgeon makes a careful dissection in the perineum until the urethra is reached and it is then opened on the groove of the staff, not upon its point. The edges of the urethra are then retracted so that the canal is clearly exposed. The staff is then slightly withdrawn and turned so that its button is hooked into the upper angle of the wound which is then further put on the stretch. The surgeon then has a view of the parts in front of the stricture, and he may be able at once to introduce the grooved probe or the gorget into its orifice, or he may have to make repeated attempts to reach the bladder. When the instrument has traversed the stricture (as shown by its freedom of movement in the bladder) an incision on the upper and lower wall of the canal is made by means of a probe-pointed bistoury and all bands and obstructions are divided. The canal is then well dilated by the forefinger of the operator, who satisfies himself that he has free access to

the bladder-cavity. The subsequent steps of the operation are the same as those followed in the Gouley operation.

External Urethrotomy without a Guide (Cock's Operation or Perineal Section).—For the very worst and most desperate class of cases in which, either as a result of chronic stricture or of traumatism with great swelling of the perineum and scrotum, the urethra anterior to the triangular ligament has been obliterated, or in which the stricture is impassable to instruments, the operation known as Cock's operation, perineal section, and external urethrotomy without a guide may be necessary.

The patient is prepared, etherized, and placed in the lithotomy position. The left forefinger of the surgeon is introduced into the rectum and its tip is held firmly against the apex of the prostate. With the right hand a double-edged knife is plunged into the perineum in the median line about an inch anterior to the anus and is carried forward without any cessation above and in the direction of the finger-tip. By an upward and downward movement this vertical incision may be made sufficiently large so that when the bladder has been entered through the membranous urethra, a probe may be introduced which will act as a guide for a goodly-sized gum-elastic or soft-rubber catheter which is passed into that viscus and is then firmly retained. By means of frequent irrigations with hot boric solution the bladder is much benefited, and the urethra may also thus be treated. In a few days the swelling in the perineum will have materially subsided, and systematic exploration of the urethra may then be attempted.

Retrograde Catheterization.—In those bad cases of laceration and rupture of the urethra and much damage to the perineum with or without fracture of the pelvis, in which it is impossible to find the proximal end of the canal, it may be necessary to resort to retrograde catheterization. This operation is performed as follows: The parts having been rendered surgically clean, a suprapubic incision is made sufficiently large to allow the passage of the index finger by which the internal vesical orifice is located. Then a gum-elastic catheter or bougie is guided through the bladder into the urethra and passed out of the proximal end of the ruptured canal in the perineum. Having thus located the proximal end it is usually easy to pass the instrument through the distal portion of the urethra. The end of the catheter is then cut off at right angles and retained in the urethra for the purpose of draining the bladder. Under these circumstances the surgeon, if he sees fit, can use the bougie or catheter as a guide, and can then approximate and suture the torn ends of the urethra together and thus prevent the formation of a traumatic stricture, or he may allow the wound to granulate and heal; it is necessary to drain the bladder as is done in external urethrotomy.

METHOD OF PERFORMING PERINEAL SECTION WITHOUT A GUIDE, ADVOCATED BY C. L. GIBSON.—The parts are rendered surgically clean and the patient is placed in the lithotomy position. Thorough preliminary irrigation and cleansing of the rectum are most essential. A suitable speculum is introduced, and the prostate is transfixed internally from the rectum, preferably by a large, sharp hook, which is driven firmly through the prostatic tissue. The speculum is now withdrawn, leaving the hook *in situ*. Median perineal section is then performed, the incision being extended down to the ordinary depth of the urethra. The left forefinger is now introduced into the wound. As the assistant executes a series of gentle tugs on the hook, one readily receives the sensation of the intermittent tension of the urethra in response to the traction on the prostate. Keeping the forefinger in place, the surgeon with the other hand directs the bistoury into that portion of the deep urethra which is thus rendered prominent; the probe-pointed director readily glides alongside the knife into the lumen of the urethra, and following it the small metal catheter will demonstrate the successful access to the bladder. The performance of these various steps requires only a minute or two.

It may be remarked that in the hands of an experienced surgeon this procedure may prove effective; but it should never be adopted without the most careful antisepsis, and never by a novice.

RUPTURE OR DIVULSION.—This is to-day practically an obsolete operation. It is a dangerous, inexact, and unsurgical procedure, and its performance would be in total violation of the present trend of thought and experience in genito-urinary surgery which teaches that damage, even slight, to the genito-urinary tract must be sedulously avoided.

ELECTROLYSIS.—The old method of electrolytic treatment of stricture need only be mentioned to be condemned. A moment's thought of the pathological condition to be treated in stricture of the urethra, and of the mode of action of this electrochemical method of decomposition, will convince any one of its futility, even harmfulness, if thoroughly used. The aim of this treatment is to decompose the newly-formed morbid tissue and to produce its absorption by means of a metal bulb affixed to a flexible bougie through which the current is passed. Now, electrolysis has not an electro-affinity for the stricture-tissue, leaving the mucous membrane unaffected, but, on the contrary, acts upon this membrane and destroys it; and whenever the mucous membrane lining a stricture is destroyed there is a grave probability that the urethra will be obliterated.

It is probable in many cases in which some surgeons have claimed beneficial results from electrolysis that this agent did not exert its pecu-

liar decomposing power, but simply acted as a stimulant, which may have, aided by other measures, tended to cause the absorption of some soft stricture tissue.

Within recent years attention has been called to the favorable results obtained by Fort's electrolyser in the class of cases for which Maisonneuve's operation is indicated. The electrolyser resembles in a general way Maisonneuve's urethrotome when the filiform guide has been attached and the knife has been pushed down the grooved staff. It really consists of two nearly equal parts, the distal one being the filiform guide and the proximal one being a fine, soft bougie (calibre about 6 or 8 French scale), through the whole length of which there is a thin, metallic wire. This wire, just before the junction of the proximal with the flexible distal portion, is bent so as to form an obtuse conical projection, which resembles the blade of Maisonneuve's instrument. This platinum blade, therefore, is the active agent in the operation. The filiform guide is passed down the urethra until the electrolytic blade (as we may call it) rests on the face of the stricture. The instrument is then connected with the negative pole of a continuous current battery and the positive pole, which is flat and of the size of one's palm, is placed near the penis, either on a thigh or on the lower part of the abdomen. The current is then turned on. This should be, in general, of a strength of ten milliampères, as shown by an attached galvanometer. During the operation, the electrolytic blade remains cool, and is gently pushed downward by the surgeon, and in many cases traverses the strictured tissue in less than a minute; but in very firm, dense, and quite long strictures, two or three minutes may elapse before the operation is complete. In cases in which there are several strictures seated at a distance from each other, more time is consumed. Haste, however, is not at all essential in these cases; indeed, it seems that a more lasting effect is produced if the blade is allowed to traverse the tissues very slowly. In this way, in all probability, a more potential action is produced. In all cases, copious irrigations with warm boric solutions should be used, both before and after the operation. On the withdrawal of the instrument, the evidence of the electrolytic action is seen in the little mass of disintegrated, perhaps slightly effervescent, tissue which comes away with it. In general, it may be stated that the operation is nearly painless; some patients make an outcry from fear, while others complain of a slight stabbing sensation. There may be no hemorrhage at all, or the flow of blood may be slight; it never is sufficient to cause any uneasiness.

The electrolyser is useful, in that it decomposes a segment of the stenosed urethral canal, and then by destruction of tissue, gives more relief than the thin incision of Maisonneuve's blade, and it does this with precision. Added to this, there need be no septic complications.

In cases of very long firm strictures and those in which the lesion consists of copious inodular masses, it will be frequently found that the electrolyser will fail to traverse them.

URETHRECTOMY.—This operation may be employed in some severe cases of traumatic and inodular stricture, which cannot be cured by external urethrotomy. In some cases the stricture mass is excised and the cut ends of the urethra are approximated and sutured, this coaptation being impossible it may be necessary to pass and retain a catheter and allow the wound to cicatrize. In this event recontraction almost inevitably occurs.

After resection of the damaged urethra the attempt may be made to restore it by means of the transplantation of mucous membrane and the formation of a partially new canal. Up to the present time this operation has not been followed by conspicuously good results.

Retention of Urine.—In the declining stage of acute gonorrhœa, usually as the result of alcoholic excesses, catching cold, great exertion, and perhaps of sexual excesses, retention of urine may occur due to great swelling of the urethral mucous membrane and of spasm of the compressor urethræ muscle. In some cases of gonorrhœal congestion of the prostate the lumen of the urethra is so compressed that urinary retention occurs. This condition may also follow operations on the perineum, testes, cord, rectum, and anus.

In cases of stricture of the urethra owing to cold, various excesses, and perhaps to rough and unskilful instrumentation, retention of urine may be produced. In the treatment of retention due to gonorrhœa, after thoroughly cleansing the glans penis the surgeon should take a well-lubricated No. 18 or 20 F. flexible blunt or olivary catheter and slowly pass it toward the bladder. If at the bulb or posterior to it he meets an obstruction, he should not use violence and he should not be in a hurry. Gently pressing the end of the catheter against the obstruction, he holds it there and waits, and usually in a few minutes it will slowly pass into the bladder. If this is not accomplished at once, the patient may be placed in a hot bath, and ten or fifteen drops of laudanum well diluted in water may be given to him. As a rule, this course will be followed by the passage of the catheter and the patient's relief. In these cases the posterior urethra is in all probability invaded, and the urethral trouble will not be materially made worse even if it is necessary to pass the catheter several times. In all cases irrigations with hot boric solution may be used in the bladder and urethra, and by them the inflammation may be checked.

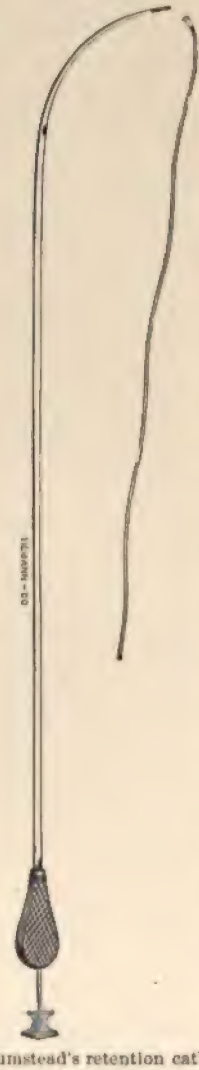
In older subjects retention usually results from urethral stricture. Having ascertained the patient's history, the surgeon passes to the face of the obstruction a flexible gum-elastic catheter about 20 F. By this

he can gain knowledge of the nature of the obstruction. If a narrow stricture is present, it is well to try to get through with the English styletted catheters of very small size, which have such stability that they will frequently pass where the French ones fail.

Fig. 59.

Thompson's retention catheter, with malleable silver probe-point.

Fig. 60.



Bumstead's retention catheter, with screw-point so that it may be attached to any filiform bougie employed with incision instruments.

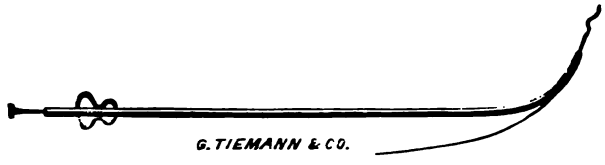
Thompson's retention catheter, when skilfully handled, sometimes produces brilliant results in the relief of retention. (See Fig. 59.) Unskilfully used, it is a dangerous instrument. Bumstead's retention catheter, which has a French filiform flexible guide, may be kept ready for use, since by it the surgeon may sometimes reach the bladder when he has almost begun to despair. (See Fig. 60.) For the use of filiforms in retention due to stricture the reader is referred to the section thereon. (See p. 189.) Having traversed the stricture with the filiform, it can be the means of guiding a small Gouley tunnelled catheter into the bladder, by which the urine may be drawn off. (See Fig. 61.)

At this time, if expedient, external urethrotomy may be performed, or the stricture may be dilated by the successive introduction of tunnelled sounds of increasing calibre. In cases of stricture retention it is often beneficial to employ hot baths, hot rectal injections, and suppositories of opium and belladonna.

Aspiration.—In very urgent cases of retention of urine from stricture, particularly in middle-aged and elderly men, or of prostatic hypertrophy in which the surgeon fails to reach the bladder with a catheter, it may be necessary to draw off the urine by means of suprapubic

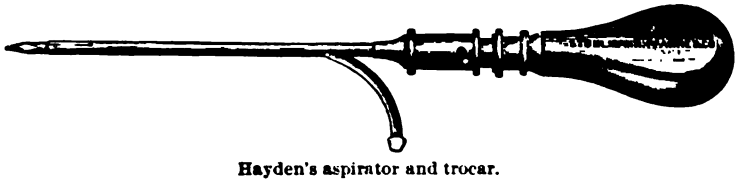
aspiration. (See Fig. 62.) For this purpose Hayden's aspirator is a simple and ideal instrument.

FIG. 61.



Tunnelled catheter staff, showing the conductor in the terminal canal and the stylet a little withdrawn.

FIG. 62.



Hayden's aspirator and trocar.

In performing aspiration it is important that the pubes should be shaved and rendered surgically clean. Then the instrument should be tested before use, and it should be made certain that the needle is pervious. It is then sterilized. The area of operation is about one inch above the upper margin of the symphysis pubis, and at most one inch on each side of the median line. In this restricted field, if proper care and caution are exercised, many punctures may be made, and by them sufficient time may be gained to allow the urethra and prostate to lose much of their engorgement and to permit the passage of catheters. In many cases as many as four punctures of the bladder daily for six and eight days may be made with local benefit and without any untoward symptom whatever. After the withdrawal of the urine a small quantity of warm boric solution may be injected into the bladder.

On the withdrawal of the aspirating needle suction should be kept up until its point is well out of the wound. Otherwise, some of the urine (and it is usually of septic character) may escape into the cellular tissues and produce an abscess.

In very rare cases the upward growth of the prostate is such that it shuts off the bladder from approach above the pubes, in which event the aspirating needle cannot reach the vesical cavity.

The points of puncture may be painted with iodoformized collodion.

It is necessary here to warn the operator not to fully empty the bladder in elderly and old men who are suffering from retention due either to stricture or prostatic hypertrophy. At the first attempt at relief if the bladder is very full and protuberant, about a pint of urine may be drawn off, and before the catheter is withdrawn half a pint of warm boric-acid solution should be injected into the bladder. When the

distressing symptoms are again felt, a similar withdrawal and an injection should be made. In this way in the course of twenty-four or thirty-six hours the patient can be much relieved. In old stricture and prostatic cases there is always a certain amount of residual urine; consequently it is the surgeon's duty to ascertain its quantity, and always after the final catheterism for relief of retention to leave a similar amount of boric-acid solution in the bladder. Failure to carry out this cautious and slow method of catheterism may result in serious bladder and kidney lesions, and perhaps in death. When all urine is suddenly drawn from the bladder in those cases where there has been more or less intense vesical, urethral, and kidney congestion, the vessels at first become suddenly exsanguinated; then, when the circulation is re-established, hemorrhage occurs into the kidneys and bladder, and death ensues.

Extravasation of Urine.—As a result of violent straining efforts in some cases of very tight strictures the urethral walls, which have become thinned and abnormally weak, give way, and the urine then gushes into the surrounding connective tissue. This is the sudden and more common form of extravasation. In contradistinction to it there is a slow or gradual form of the accident, which begins in a limited manner as a small abscess, probably of follicular origin, which slowly increases until an opening is tunnelled by which the urine may slowly or gradually escape into the surrounding tissues. In this latter event the escaping urine may become walled in by inflammatory exudation, and a hard or fluctuating lump may be felt usually in the perineum.

Rupture of the urethra may occur (1) in the course of the penis as far back as the anterior layer of the triangular ligament. It may rupture (2) in its membranous portion, between the layers of the triangular ligament, and (3) behind the triangular ligament, either at the junction of the membranous and prostatic urethra or in the prostatic urethra itself. The direction of the extravasation varies according to the part of the urethra which is the seat of rupture.

Rupture of the pendulous urethra, which is rather rare and due either to stricture or impacted calculus, causes much swelling of the organ. The fibrous covering investing the corpus spongiosum, which consists of fascia derived from the suspensory ligament of the penis and from the deep perineal fascia, may remain intact, and then the swelling pushes down to the root of the penis and the scrotum; or this fibrous investment may be ruptured, in which case there is much extravasation into the connective tissue of the penis itself and also into the scrotal tissues.

When rupture takes place just anterior to the triangular ligament, the urine is prevented by this dense stricture from escaping into the pelvic cavity. It cannot diffuse itself down the thighs, because the deep perineal fascia is firmly adherent to the ischiopubic line; conse-

quently, it takes the easy course and ascends up the hypogastrium between the pubic spine and the symphysis. The extravasation may in severe cases reach as far up as the umbilicus.

Extravasations between the two layers of the triangular ligament in the membranous urethra may be due to stricture, traumatism, impacted calculus, and careless urethrotomy. In these cases suppuration and sloughing are prone to occur more or less promptly. The urine forms for itself a sinus usually anteriorly and sometimes directed backward. In the first case the morbid swelling shows itself in the perineum and scrotum, and in the second in the pelvis, where it may be detected as a boggy mass by means of the finger in the rectum. Extravasation in the prostatic urethra may result from operations on the prostate urethra, fracture of the pelvis, impacted calculus, and stricture anterior to this region.

When the extravasation occurs behind the posterior layer of the triangular ligament, the urine may gush or leak out down the rectovesical space and points in the perineum anterior to or at the sides of the anus; or it may ascend through the pelvic fascia near the puboprostatic ligament, and then diffuse itself through the prevesical space. In these cases much information may be obtained by digital examination of the rectum, by which doughy swellings around and to the sides of the prostate and in the rectovesical space may be made out.

The **symptoms** of extravasation of urine are generally well marked. Extravasations anterior to the triangular ligament usually present such marked features that they are promptly recognized. The symptoms of rupture into the membranous urethra may at first be mild, but they grow worse as the urine tunnels for itself a passage and allows of copious extravasation.

Extravasations behind the triangular ligament may be attended by marked symptoms when the gush of urine is prompt and copious. In some cases, however, the extravasation takes place quite slowly, and then the symptoms may not be well marked and are not appreciated for a day or more.

Usually a patient suffering from extravasation states that he felt something give way, and experienced a sensation of relief, but he wonders why his urine does not flow away normally. Very soon systemic symptoms set in. The patient complains of great weakness and depression, nausea, fever, and perhaps chills. Then it is noticed that the scrotum is more or less, even enormously, distended, and that the swelling extends up to the hypogastrium, perhaps to the umbilical region, or laterally in the iliac region. The skin then becomes tense and erysipelatous, and to the finger-tips gives the sensation of emphysematous crackling. The bright-red hue rapidly becomes ducky, purplish,

and even gangrenous. Sloughs of skin may come away, and in some cases the whole scrotum is destroyed, leaving the testicles bare.

Unless relieved by operation, patients suffering from extravasation go on from bad to worse. Nausea, vomiting, total anorexia, mild delirium, high fever, and a small wiry pulse are the chief symptoms. The patient becomes more feeble, and has a dry, parched tongue, his muttering delirium increases, and he perishes in coma from uræmia and septicæmia.

It is very probable that the condition of the urine has much to do with the course and gravity of extravasation. If this fluid is in an aseptic condition, it is much less destructive (and it is claimed by some not at all destructive) to the tissues. Consequently, necrosis and its concomitant, septicæmia, may not occur, particularly if prompt relief is given by the knife. Unfortunately, in the majority of cases in which the urethra is the seat of tight stricture, the walls behind it are much damaged and the bladder is deeply affected. The urine, as a result, is largely mixed with pus, and is poisonous to tissues with which it may come in contact.

Treatment.—It is most important in all cases of extravasation to perform external urethrotomy promptly (see pp. 212, *et seq.*), and introduce a perineal tube, and irrigate and drain the bladder. When the penis is much swollen, several longitudinal incisions (about 2 or 3 inches long) should be made well down in the connective tissues. Then all sloughs should be carefully removed, and the parts should be freely and constantly irrigated with hot sublimate solution 1 : 5000, and hot saline solutions. In like manner, if necessary, deep incisions should be made into the scrotum, the perineum, or the anterior abdominal walls, and the wounds should be aseptically treated, care being taken that all sloughs and gangrenous tissue are removed and the parts rendered as clean as possible. In most cases much benefit will follow the careful squeezing and pressing of the tissues by the finger-tips, by which means morbid secretions may be removed.

In the rather rare event of extravasation into the prevesical space it will be necessary to make a free suprapubic incision through the anterior abdominal wall in order to irrigate the parts thoroughly and frequently and drain them. All these wounds must be carefully packed with iodoform or sterile gauze, which should be held in place by layers of sterilized cotton and gauze and a retention-bandage. It is very important that the dressings of these patients shall be carefully watched and frequently renewed, and that their beds shall be kept in a state of cleanliness. By means of great care and attention the fetid and ammoniacal discharge may soon disappear, and the sloughs will separate and leave a healthy surface.

We are generally called upon to sustain the sinking powers of life by the free exhibition of nourishment and stimulants, such as beef-tea, brandy, milk-punch, carbonate of ammonia, quinine, strychnine, etc. Opium is of much value when there is much pain or nervous irritability.

In cases of shock it may be well to inject hot normal salt solution into the median basilic vein, or into the rectum, or subcutaneously.

Urethral Fever, or Urinary Infection.

Following operations upon the urethra and bladder for stricture, cystitis, vesical neoplasms, calculus, retention, and prostatic hypertrophy, particularly in chronic cases of young men, in men approaching middle age, and in old men, certain febrile disturbances of mild or severe character, and septic infectious conditions are sometimes observed, which have been variously called urethral fever, urinary fever, catheter fever, urinary poisoning, and urinary infection.

After such simple operations on the urethra as the gentle passage of a bougie or catheter, incision of the meatus, and even the introduction of the meatus sound, some patients become faint, pale, and may lose consciousness. This condition is simply a mild form of shock, and is analogous to the fainting spells following blows on the testes or cord or the subcutaneous ligature of the spermatic veins. In some cases these symptoms are mild and very ephemeral, while in others they are more severe and prolonged. Though these conditions are generally considered under the head of urinary fever, they are in no sense related to that condition. They are simply the evidence of reflex nervous action.

After instrumental operation on the urethra patients may have a slight rise in temperature, preceded or perhaps followed by a chill, which passes off and does not recur. This condition may be observed in some cases with the passage of the first urine after urethrotomy, tight catheterization, or divulsion. This condition represents the mild and ephemeral form of urethral fever. In it the patient is only mildly sick.

The second form is that which is called "acute urethral fever," in which the chill is severe and often prolonged, the rise in temperature sudden (104° to 106° Fahr., and even beyond this), and in which the systemic symptoms are correspondingly severe. In some cases defervescence is ushered in with sweats. This condition may last one or several days, and it may recur at intervals. The patient is usually a quite sick man.

This second form may cease or it may become chronic, and it is then called "chronic urinary fever." This is mostly observed in elderly and old men suffering from stricture, and its pathological sequences in the membranous and prostatic urethra, bladder, and perhaps kidney, and also in cases of prostatic hypertrophy, calculus, and vesical neoplasms.

The fever is of a mild type, perhaps continuous, and again it may be intermittent. During its course irregular slight chills or severe rigors may be experienced. This condition is indicative of grave trouble of the whole urinary tract, and it tends to undermine the patient's health. Persons thus affected lose flesh, become sallow, suffer severely from dyspepsia, and gradually lose ground, until they die either from uræmia or septicæmia.

In most of the very severe cases there is suppression of urine.

Urinary infection with fulminating lethal symptoms has sometimes been observed. In a classical case in medical literature a man broken in health and suffering from tight stricture, who was catheterized without violence, pain, or bleeding, was seized immediately after the operation with a severe rigor, passed into syncope, and died in a few minutes. In another classical case the stricture in the pendulous urethra was long and tight. It had been mildly dilated, and six and a half hours after the passage of a small sound the man suddenly collapsed and died.

The underlying primary cause of urinary fever is some inflammatory focus in the urethra and bladder. When this condition is well marked and chronic, and the urethra and bladder are decidedly affected and the urine is septic, then the patient is liable to urinary infection. If the pathological changes are as yet not far advanced, the results of instrumental manipulation in disturbing them are mild and show themselves by the ephemeral form of fever. When the changes are more chronic and deep-seated, the tissues react more violently and the fever is more severe.

In the grave order of cases there is always coexisting renal impairment. Now, on this pathological basis as a result of damage, even mild, done in operation, certain microbes seem to luxuriate, and they secrete the poison which gives rise to the inflammatory and septic phenomena already described. An attentive reading of the results of the various investigators seems to show that the chief morbific agent in urinary poisoning is the bacterium coli commune. We cannot say definitely where this microbe breeds and has its being—whether it is in the affected tissues or in the urine, probably in the latter, and perhaps in both. It seems certain that without tissue-disturbance and trauma this micro-organism may remain dormant, but that when the condition of the tissues has become altered by loss of epithelium and other unknown states, it becomes hostile and produces urinary poisoning.

In many patients this microbe seems to hibernate, and does not become pathogenic even when there is much tissue damage (they seem in a measure immune to its action), while in others the slightest trauma seems to be the starting-point of its virulence and its wildfire-like spread. Perhaps in some patients the vitality of the microbe is weak, and it is

imperfect in its development. It is a significant fact that in all very grave cases there is more or less presumptive or conclusive evidence of renal derangement. The urethral and vesical disturbances then seem (how we cannot exactly say) to react promptly on the kidneys, and as a result we have the mixed conditions of urinary infection and of uræmia, and more or less, even total, suppression of urine.

While we can thus speak with considerable certainty as to the presence, nature, and pathological action of the bacterium coli commune, we are as yet in the dark as to the rôle of the pathological action of the pyogenic microbes which are also found in pathological urine and in the genito-urinary tract.

The practical lesson to be learned from all these researches is to do as little violence to urethral and vesical tissues as possible, and to be thorough in the matter of asepsis and antisepsis. It can be readily seen that drugs taken internally cannot efficiently act upon the morbid conditions of the tissues or on the microbes and their poisons contained in the urine.

Treatment.—The essential point in the treatment of all cases of lesions of the urethra, prostate, and bladder is to be so thorough in the matter of antisepsis that urinary infection will not occur. To this end all operations on these parts should be attended with much care in the matter of thorough drainage, and frequent and copious irrigations with hot saturated boric or bichloride solutions, 1 : 5000, should be made.

The ephemeral chills and fever sometimes observed may require little or no treatment beyond rest in bed, diluent drinks, with perhaps salol, quinine, and opium. In all these cases instrumentation or operation in the urethra or bladder should be accompanied with careful antiseptic irrigation. This applies to operations for stricture, and on the prostate and the bladder. In cases of chronic cystitis and hypertrophy of the prostate, in which fever is observed, the frequent and careful withdrawal of the urine by means of a sterilized catheter, and the thorough irrigation of the urethra and bladder with antiseptic solutions, are absolutely necessary. In many cases of prostatic hypertrophy the occurrence of fever may be avoided by the judicious use of the catheter, which prevents the damage to the prostate and urethra that sometimes occur in the straining incident to urination. In some of these cases the avoidance of the passage of the urine over the urethra, which is obtained by the use of the catheter, undoubtedly tends to prevent or lessen the tendency to local infection and its resulting fever. When the kidneys are coincidentally involved and the urine is albuminous and bloody, and in cases where suppression of urine occurs, it is necessary to resort promptly to hot-air baths and to cups over the kidneys, and to administer internally tincture of digitalis, sweet spirits of nitre, and diuretin, and to give the patient plenty of pure water to drink.

When there is tendency to shock and syncope, hot normal salt solution may be injected into the median basilic vein, or subcutaneously, or into the rectum.

Stricture of the Urethra in the Female.

This is a rather rare affection and is usually the result of traumatism during child-birth, of chronic gonorrhœa, of cicatrization of chancroidal or syphilitic ulcers, and perhaps it may be due to urethral calculus and to damage of the parts sustained in the removal of vesical calculi, caruncles, and neoplasms. The parts usually involved are the internal vesical orifice and the tissues at and near the meatus, the middle portion of the canal generally being unaffected. These strictures are formed of dense fibrous tissue whose tendency is to contract gradually and lessen the calibre of the canal, until in some instances it is scarcely pervious.

The symptoms are well marked in proportion to the development of the stricture. As the lumen of the urethra becomes smaller, the difficulty in urination increases until it may in the end be almost wholly retarded. In women as in men with urethral stricture, more or less complete retention may result from exposure to cold, fatigue, and to alcoholic and sexual excesses.

It is rare to observe vesical and renal complications in women as the result of stricture.

Diagnosis.—The diagnosis of urethral stricture in women is usually very easy. In some cases a nodular condition of the canal may be made out by the finger-tip in the vagina pressed against the lower wall of the urethra. When the stricture is very small and tight, it may only be possible to pass a probe through it into the bladder. In other cases olivary bougies of various size may be tried, until one is passed by which the calibre of the stricture may be determined.

Treatment.—In all cases it is necessary after careful antisepsis to make a free incision on the upper and lower wall of the urethra, and then to pass every few days a full-sized meatus-sound in the same manner as is done in the male.

In some cases the stricture may be so small that it is necessary to incise it with a Gouley's beaked bistoury, while in others the straight blunt bistoury will work well.

In some cases prompt relief of the stricture may follow urethrotomy performed with the Maisonneuve-Fluhrer instrument. If in these cases the bladder has become affected, it will be necessary to use hot boric irrigations followed by dilute nitrate-of-silver solutions and suitable internal medication.

CHAPTER XI.

AFFECTIONS OF THE PENIS.

PHIMOSIS.

PHIMOSIS is that condition of the prepuce which prevents its retraction and the exposure of the glans. It may be congenital or acquired.

Congenital Phimosis.

The morbid structural conditions giving rise to congenital phimosis are—first, the narrowing, sometimes entire occlusion, of the preputial orifice; second, a straightness and narrowness of the prepuce itself; and third, shortness of the frænum. To these may be added, in the acquired form, redundance of the prepuce. The orifice of the prepuce may be as small as a pin's head, when it may offer an impediment to urination and prevent inspection of the meatus, and as large as the diameter of a pea. (See Fig. 63.) Not infrequently patients who have not suffered from phimosis in their youth do so later, owing to the growth of the glans penis and to the concomitant imperfect development of the prepuce.

FIG. 63.

Congenital phimosis in the infant.

In most cases of congenital phimosis there are adhesions between the mucous membrane and the glans. These may be thin, small, but numerous and easily broken up, or they may be extensive and firm, even to the complete adherence of the whole prepuce and the glans.

Congenital phimosis gives rise to balanitis, heat, itching, even pain, in the head of the penis, and a consequent erethism of the genitals, with frequent erections, symptoms pointing to stone in the bladder, lascivious dreams, seminal emissions, and incontinence of urine, especially at night. Such subjects are often addicted to masturbation. As they grow older there is in many an arrest of development of the penis. When puberty is reached any or

all of the foregoing symptoms may exist, and such subjects often complain of too speedy ejaculations and a not satisfactory and complete enjoyment of sexual intercourse.

In early life, as remote effects of phimosis, it has been conclusively shown that nervous disturbances, incoordination of the muscles of locomotion and of speech, hyperæsthesia, amblyopia, and hypochondriasis have been produced.

It must be remembered, however, that there are many cases of phimosis which are not attended by any of the foregoing symptoms, direct or remote. At puberty and later, however, phimosis always gives rise to unpleasant symptoms of varying degrees of severity, such as balanitis and interference with erections and the sexual act. At this period, particularly, it is a prolific cause of masturbation and of a morbid desire for coitus.

In some cases of congenital phimosis plates and masses of smegma form under the prepuce, which is bulged out by them. Sometimes these smegma-masses are so firm in structure that they are mistaken for calculi. They may remain in an indolent condition for years, and may give rise to no symptoms.

Fig. 64.

Fig. 65.

Smallness of preputial orifice, with fibroid frænum.

Chronic Inflammatory Phimosis.

There is a condition of the penis in which patients suffer much discomfort until relieved by operation. It is admirably shown in Figs. 64 and 65. This condition consists in smallness of the preputial orifice, smallness as to calibre, and shortness of the prepuce, together with a short fibrous frænum. In these cases all the unpleasant symptoms of phimosis are present, and a chronic rebellious balanitis is an important

factor. Usually, in such cases, the glans remains stunted and small in circumference and length, as is well shown in the figure.

The morbid process in phimosis of all forms may be simply inflammatory œdema, or this condition plus simple or specific cell-infiltration.

Acquired Phimosis.

Acquired or accidental phimosis may exist in a prepuce normally rather small, but capable of thorough retraction, or in one which in the normal state passes readily backward and forward over the glans. The causes of it are want of cleanliness, the decomposition of diabetic urine, excessive venery, perhaps increased by the abuse of stimulants, gonorrhœa, herpes preputialis, eczema, chancroids, and hard chancres. Traumatism and compression of tightly-fitting pantaloons are also causes.

Fig. 66.

Gonorrhœal phimosis.

Fig. 67.

Phimosis with the pouting chin.

The symptoms vary in severity and in the nature of their concomitants according to the cause.

Phimosis resulting from uncleanliness and excessive venery presents nothing characteristic. The prepuce is red and inflamed, and there is more or less balanitis. It is usually an ephemeral trouble and readily amenable to local remedies.

Gonorrhœal Phimosis.

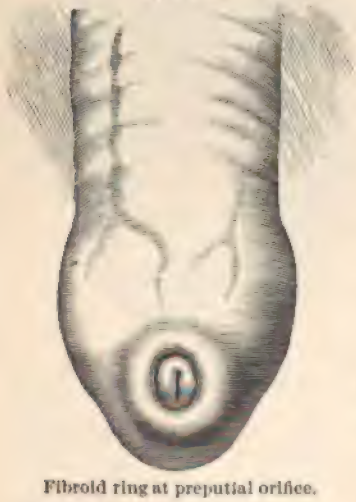
Phimosis complicating gonorrhœa is often a troublesome concomitant, since it interferes so much with the treatment of that affection. There are commonly much redness and swelling, which often produce curious deformities of the organ, as shown in Fig. 66, in which the prepuce is much swollen. In some cases the penis is curved upward, in others downward, and sometimes laterally. Sometimes the intensity of the inflammation is seated in the prepuce near the frænum, which becomes swollen and turned inward, giving the appearance of a pouting chin. (See Fig. 67.) Then, again, the whole extent of the foreskin may be involved, in which case the distal end of the penis becomes greatly swollen and comes to resemble a miniature Indian club. In all of these cases there is a purulent urethral discharge. Phimosis caused by herpes progenitalis presents redness and œdema of the distal end of the penis, together with vesicles.

Gangrene is a rather uncommon complication of the simple forms of inflammatory phimosis, excepting when due to traumatism and diabetes. It is not very rare in the severer forms.

Cicatricial Phimosis.

Cicatricial phimosis belongs to the category of the acquired affections. Cicatrices frequently follow fissures and ulceration which have been produced by forcible retraction. A fibroid preputial ring is not uncommonly seen in cases of phimotic prepuce. Chronic balanitis also, in some cases of long and somewhat phimotic prepuce, causes a condition of cicatrization of its outer preputial layer which much intensifies the phimosis. Such is the stenosis of the preputial orifice in some of these cases that circumcision alone will relieve the patients of their discomfort and suffering. Recurrent herpes preputialis may cause stenosis of the orifice, either from scars or infiltration. It is somewhat remarkable that in some cases of phimosis, where retraction has been impossible throughout life, little if any suffering has been produced. In Fig. 68 is shown a phimotic prepuce with a firm fibrous ring at the orifice, the development of twenty-five years. In this case there was no suffering

Fig. 68.



Fibroid ring at preputial orifice.

or discomfort, and the development of the fibroid tissue was so aphlegmasic that it was not appreciable to the patient.

From puberty to old age recurrent balanitis, even in persons having roomy foreskins and of cleanly habits, sometimes leads to increase and induration of the subpreputial connective tissue, and converts that appendage into a rather resistant, inextensible cylinder, which is with difficulty retracted. In some cases the subpreputial connective tissue is converted into flat, firm plates of tissue, which prevent retraction and favor inflammation.

Phimosis from Obesity.

In elderly men, as they advance in age and obesity, the integument of the penis often becomes redundant and lax. As time goes on, the prepuce becomes much elongated and extends well down beyond the end of the glans. The organ then, in many cases, becomes a source of discomfort. The inner layer of the prepuce becomes hyperæmic, and the urine and smegma readily decompose and cause irritation, with burning sensations.

Phimosis from Intrapreputial Lesions.

The initial lesion of syphilis, when seated on the inner leaf of the prepuce at the frænum and in the sulcus, very frequently in the lower classes produces phimosis, caused usually by want of care and uncleanliness. The distal portion of the penis becomes much swollen, and in typical cases the inflammation is of a low grade. Then the organ at the preputial portion is of a deep bluish-red, not hot or painful. In some cases the induration may be made out by palpation, but usually as the phimosis develops the sclerotic mass or nodule is so masked by the surrounding œdema that it cannot be recognized. Usually the condition remains rather aphlegmasic. The indurated tissues continue to have the bluish-red color, without heat or pain, and the condition is further complicated with typical enlargement of the inguinal ganglia. In some cases pus, and in others seropus, escapes from the preputial orifice.

In other cases, however, the initial lesion under the prepuce in phimosis becomes inflamed, and then the condition resembles chancroidal phimosis. In many of these cases chancroids form at the free end of the prepuce, and a mistake in diagnosis is then very liable to be made. In such cases the history and the condition of the inguinal ganglia may afford aid in the recognition of the real condition of affairs. Chronic indurating œdema, complicating chancres, and secondary lesions, may cause phimosis.

Treatment.—In all cases of congenital phimosis circumcision should be performed at as early an age as possible. Efforts made to expand the preputial orifice in young children are usually painful and produce only a partial and temporary relief.

In cases of inflammatory phimosis the patient should assume the recumbent position and should partake of a light diet. The preputial cavity in the height of the inflammation should be well irrigated several times a day with very warm lead-water, and in the intervals the penis may be well wrapped with absorbent gauze, which is saturated with the same lotion. In a few days bichloride irrigations, 1 : 2000, may be employed.

As soon as retraction of the prepuce is possible, lint or old linen or absorbent cotton soaked in lead-and-opium wash must be placed between it and the glans, and treatment followed as given in the section on Balanitis.

Phimosis from gonorrhœa needs active and continuous treatment, in addition to that of the acute stage of the discharge. Intrapreputial irrigations, very hot, frequently made, and large in quantity, of bichloride solution 1 to 2000 or 3000, or of a saturated boric-acid solution, or of a 1 per cent. carbolic solution, should be employed. The penis should be kept in an elevated position; care must be taken to catch and remove the discharge.

THE OPERATION OF CIRCUMCISION.

Circumcision should be performed as soon as possible in cases of chronic phimosis, cicatricial phimosis, and phimosis complicated by intrapreputial vegetations.

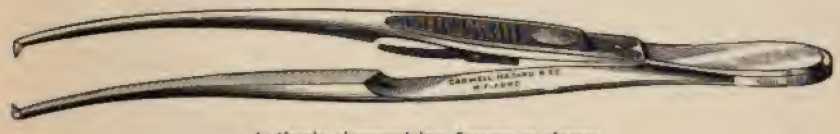
In performing the operation of circumcision it is necessary to remember that the prepuce is composed of two layers, separated by a cellular tissue of such lax texture as to admit of an almost indefinite amount of motion between them. The internal or mucous layer is firmly attached to the penis posterior to the corona glandis, and hence is incapable of being drawn forward to any great extent in front of the glans. The external or integumental layer, on the contrary, is continuous with the flaccid skin of the body of the penis, and may be greatly elongated.

Previous to the operation of circumcision the penis should be carefully examined by the surgeon with a view of acquainting himself with the conformation of the parts and of determining the amount of tissue to be taken away. If retraction of the prepuce is possible, it is important to study the size, shape, and relations of the frænum, and the calibre of the cutaneous sheath at the part where it encircles the glans. Then it is necessary to inspect the raphé closely, in order to see whether it

runs directly in the median line, or whether it deviates, as it sometimes does, to one side or the other toward the end of the prepuce.

I prefer the following operation for its simplicity and excellency of results. The patient having been prepared and placed on the operating-table, the prepuce is drawn well forward, and the clamp or forceps (Fig. 69) is applied, not in a vertical direction at right angles with the long

FIG. 69.



Author's circumcision forceps or clamp.

axis of the penis, but in an oblique position, following the line of obliquity of the glans. When the clamp is on, it is necessary to examine the skin of the penis to see that too much of the tissues will not be taken away, and that the organ in erection will not be interfered with or drawn backward. While the clamp is adjusted, cocaine anæsthesia may be produced by the following simple procedure: A syringe being filled with 8 per cent. muriate-of-cocaine solution, its needle, an inch and a half long, is introduced between the two layers of the prepuce on one side obliquely, in conformity with the blades of the forceps. When the needle has traversed the whole of one side of the included prepuce, a few drops of the cocaine solution are injected, and as the needle is slowly withdrawn, the fluid is left in its track. Then the same procedure is followed on the other side of the prepuce. The parts are then left alone for a few minutes, in order that anæsthesia may be produced. After the lapse of about five minutes the blades of the forceps are slightly separated, and thus kept for a few minutes, in which time the immediate tissue behind the forceps blades will become anæsthetized. Then the clamp is again put on firmly. By this procedure we avoid the unpleasant, even dangerous, symptoms of cocaine intoxication and poisoning. Traction on the distal end of the prepuce by a ligature or forceps is now made, and a straight bistoury is introduced through the middle of the prepuce, the flat of the blade resting on the clamp. An outward cut is then made, and a second inward cut removes the cutaneous layer of the prepuce. Some cocaine solution is now poured over the bleeding surface. The surgeon then retracts the mucous layer of the prepuce, and ascertains its length and the condition of the frænum. The parts having become anæsthetized, a ligature is run through the mucous layer, and traction is made by it, and the forceps is applied in the same oblique manner to this part. The second incision is then made in precisely the same manner as the first was. It is generally

necessary to crowd the glans backward somewhat, but the surgeon should always make allowance that one-third or one-half of an inch of the mucous layer of the prepuce shall be left, and that as much of the frænum shall be spared. When too much of the mucous layer is taken away, and when the frænum is nearly, if not all, ablated, a bad result is always obtained, and the patient may experience much discomfort for the rest of his life. The incised mucous and cutaneous layers are then coapted, and before the sutures are put in the surgeon should study the conformation of the parts with a view to future symmetry. In general, the raphé and the frænum are in distinct anatomical continuation, and then the surgeon in his suturing simply follows these natural landmarks. If, however, there is a deviation of the raphé from the middle line, this must be considered, and the line of union so placed that a natural arrangement of the parts will be produced after healing. There is usually more or less hemorrhage, but this very rarely gives any trouble. When the edges are properly coapted the sutures of fine silk or catgut should be put in at a distance of a sixth of an inch from the margin of the wound, well through the whole thickness of the skin and mucous membrane. These sutures should be placed about one-sixth or one-eighth of an inch apart, so that no connective tissue will be exposed between the cut edges. By these quite numerous sutures all bleeding is prevented and prompt healing is produced. Whenever the sutures are placed far apart, the raw submucous connective tissue pushes up between the two cut surfaces, and the process of healing is materially prolonged. The parts are then dusted with iodoform or aristol, and well and sufficiently firmly bandaged with absorbent gauze. The first dressing may, owing to oozing, have to be removed on the third or fourth day, and then replaced by a similar one. If the dressing looks clean and the patient is comfortable (there being no itching, smarting, or uneasiness in the penis), the first dressing may remain on several days. When thorough antisepsis is practised, perfect union may result in a few days, particularly if the patient can remain in the recumbent position and if medication to prevent erections has been administered. Erections sometimes materially delay union. The sutures may then be removed, and a dressing applied for a few days. Usually two or three dressings are sufficient. After the operation the parts may be more or less sensitive for a time, but they gradually adapt themselves to their altered condition.

In some cases of urgency it may be necessary to perform circumcision, and the proper instruments may not be at hand. In this event the following simple operation may be performed: The parts being properly cleansed and shaved, the prepuce is drawn forward (if retractible) over the glans; then, by means of a pair of scissors with long blades,

an incision is made in the middle line on the dorsum of the penis. The prepuce then appears like two dog's ears, which must be cut off with the scissors, following the line of obliquity of the glans. In this operation it is necessary to be careful that the two incisions of the dog's ears are symmetrical, that too much tissue is not taken away, and that the frænum is left intact. The parts are then sutured, the same care being taken as has already been pointed out. The dressing is the same as that of the first operation.

PARAPHIMOSIS.

Paraphimosis is that condition in which the prepuce, retracted behind the corona, cannot be pushed forward over the glans.

It is found in young boys who, perhaps from curiosity and with some force, have retracted the prepuce for the first time. It also occurs in young subjects as a result of masturbation. In these cases the young boy usually complains of pain quite early, and reduction is commonly not attended with difficulty.

Paraphimosis occurs in older persons who have a long foreskin and narrow preputial orifice; in those who have a long, straight, and more or less tight foreskin; in patients who have a short frænum; in those who have short and rather tight foreskins habitually worn over, and only partially covering, the glans; in those having short, not abundant, foreskins worn behind the glans; and, finally, in those whose foreskin is in perfect proportion to the glans.

Causes.—The causes of paraphimosis are, primarily, the more or less developed malformations; secondly, inflammation causing constriction, balanitis, excessive coitus, perhaps increased by alcoholic excess; coitus with a woman having a small vulvar orifice; traumatism, gonorrhœa, eczema, lymphangitis; the retraction of a phimotic prepuce the seat of intrapreputial vegetations; chancroids and hard chancres. It is seen in all grades of mildness, in which it is reducible, and in all stages of severity, in which reduction is more or less difficult and even impossible without operation or incision.

The mechanism of paraphimosis is very simple. Retraction of the tight preputial orifice behind the glans leaves a fold or ring of mucous membrane just behind and continuous with it, and which ceases at a more or less deep furrow, and beyond this furrow is a swollen ring or fold of integument. The ring of mucous membrane is the inner surface of the prepuce; the furrow is formed by the orifice of the prepuce, at the bottom of which it acts as a constricting ring, while the cutaneous fold or ring beyond is the external layer of the prepuce. In this condition inflammation begins and increases. The glans becomes swollen and red, even purplish, in color; the mucous collar of the penis becomes

red, œdematous, and puffed out like a bladder; the constricting preputial ring strangulates the parts more and more as they become swollen; and the cutaneous ring or collar beyond it also becomes more red and œdematous. In such a case, if relief is not obtained, the condition of affairs becomes worse. Besides the engorged glans, the chief swelling is seated under and just behind it on each side of the frænum. When seen quite early this chin-like protrusion of mucous membrane is found to be filled with serous effusion. (See Fig. 70.) As time goes on, this is replaced by fibrinous and cellular exudation, and this chin-like body becomes hard and resisting. Coincidently with this the strangulation of the glans is greater; the mucous-membrane pad behind it is more red, swollen, and infiltrated; the constricting ring is correspondingly smaller; the cutaneous ring of prepuce behind it more swollen. In this state the penis often becomes twisted in spiral and other peculiar forms, curved nearly at a right angle, and sometimes distended to the point of strangulation (Fig. 71). In conditions thus seemingly desperate the parts may remain, and become permanently fixed by cell-exudation. Generally, however, nature intervenes, if art is withheld, and the constricting ring is attacked by ulceration or gangrene; in which case a longitudinal fissure forms along the dorsum in the mucous layer of the prepuce, and a corresponding one in the cutaneous portion. These increase, fuse, involve the preputial ring, and end by forming an ulcer seated transversely to the axis of the penis and behind the glans. Constriction is then ended, the patient's sufferings are relieved, but much œdema and engorgement may remain.

Fig. 70.

Acute reducible paraphimosis, with profuse serous effusion.

In somewhat exceptional and anomalous cases there are two points of strangulation—the one at the preputial orifice or ring, the other in the mucous membrane at the base of the corona glandis, and largely due to the excessive engorgement of the part. Then in other cases the retraction of the prepuce is incomplete, and the orifice or ring only slips back behind, and not much beyond, the corona, where it is firmly held, and is with difficulty reduced except by operation.

Gangrene, however, may occur under these circumstances and may result in the destruction of more or less of the integument or glans, may involve the urethra, may perforate a blood-vessel, cause intense suppurative inflammation, and lead to lymphangitis. (See Fig. 71.)

FIG. 71.

Paraphimosis with gangrene.

In the paraphimosis due to the initial lesion the parts are hard and brawny, and the process is of a subacute nature. In the paraphimosis complicating chancroids we have the simple condition plus much ulceration, inflammation, and swelling. In these latter cases, if not treated promptly, there may be destruction of tissue of greater or less extent. There may therefore be resulting deformity in these severe forms of paraphimosis.

Prognosis.—The prognosis of paraphimosis depends entirely upon the stage of the trouble when first seen. If the surgeon is consulted early, reduction can be accomplished without difficulty, If later, when

strangulation has taken place, various sequelæ, from the dorsal ulcer or gangrenous spot to more extended gangrene and destruction of the integument and perhaps portions of the glans and urethra, may occur.

Treatment.—The first procedure necessary in a case of paraphimosis is to wash the penis thoroughly with soap and water, and after drying the parts to irrigate them thoroughly with warm bichloride solution, 1 : 2000. Then the parts having been cocainized, reduction should be attempted, and in case of its failure an operation is necessary. Previous to attempting reduction a little olive oil or vaseline may be smeared in

Fig. 72.

Paraphimosis: penis curved nearly at a right angle.

the balanopreputial furrow, but not on the glans, since it then causes the operator's fingers to slip.

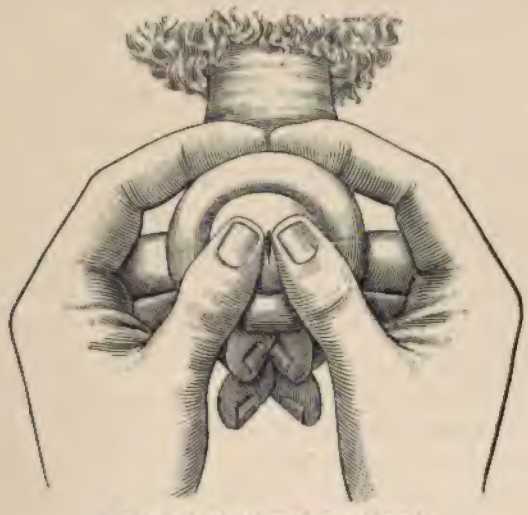
It should be clearly borne in mind that in those cases in which the mucous membrane of the region of the frænum is translucent and much serum is seen (see Fig. 70), multiple punctures, followed by gentle pressure by the hand around the head of the penis, will always be followed by benefit and the prompt reduction of the parts.

Several methods of reduction may be employed. A simple plan is to make a ring of the forefinger and thumb of the left hand, which firmly encircles the penis behind the constriction; at the same time that this hand is drawn forward, the glans, grasped by the fingers of the right hand, and at the same time compressed and elongated, is pushed backward, and reduction may follow. Another method is to take the penis behind the constriction between the index- and middle-

fingers of both hands, and, making very firm traction while the thumbs crowd down upon it, knead and press the dorsum and base of the glans backward. (See Fig. 73.)

In many cases incision of the constricting band is sufficient to relieve the parts. Since in most cases this is seated in the furrows already described, a curved bistoury may be introduced on the flat surface on the glandular side of the constriction, well down under and through it, taking care not to wound the corpora cavernosa. If the swelling is such that the curved bistoury cannot be introduced beneath the band, a straight one may be used. This should be introduced at right angles to the penis at the outer edge of the constriction, and a number of firm but

Fig. 73.



Method of reduction of paraphimosis.

not deep cuts should be made, the operator being slow and deliberate in his movements with the point of the instrument until the band is felt to give way.

In some cases it is necessary to incise the mucous membrane and skin in the line with the incisions already spoken of. When this is done, it is well to inquire as to the natural length of the prepuce, and to make the incisions in conformity with the facts ascertained. Another rule is to take the length of the glans as the guide, and make the incision as long as that. As a result of this procedure the patient subsequently has the so-called dog's-ear prepuce, which requires a further operation to complete the circumcision.

When the constriction exists just behind the glans, it is sometimes with difficulty made out, and much care must be observed to cut it alone.

Cases of chronic paraphimosis in which cicatricial adhesion has taken place require long and patient treatment. The parts should be soaked in hot water two or three times a day, and then the segment behind the glans may be compressed for several hours a day by a rubber bandage. When absorption has gone on to such an extent that movement, even slight, of the prepuce over the corpora cavernosa is possible, it is well to free the cutaneous ring-like end of the prepuce and the mucous end of it, which are at the constricting furrow, either by gentle dissection or by tearing apart with a blunt instrument. Then, when these parts are loosened, a longitudinal incision of nearly or possibly an inch long is made into each of these segments of the prepuce. Then, after one or more attempts, reduction will usually follow and the typical dog's ears will be seen. The case then requires cleanliness, and later on ablation of the lateral portions of the prepuce.

BALANITIS.

The term balanitis may be applied to inflammation of the mucous membrane of the glans, or of the prepuce, or to both conditions combined.

Simple Forms.

This affection is most commonly seen in persons having some abnormality of the prepuce, such as smallness of its orifice, straightness, tightness, and redundancy, and shortness of the frænum. It is also seen in persons having a normal penis and in those whose prepuce is very short. In most cases it shows a tendency to relapse, and one attack predisposes toward subsequent ones. It exists in an acute and a chronic form, and in all degrees from mild to very severe. The symptoms vary according to the severity of the case. In some there is a moderate itching sensation; in others, a burning pain of various degrees.

In its most simple form balanitis presents a very red, somewhat thickened surface, covered with a milky secretion emitting a penetrating and offensive odor. This condition is very amenable to treatment.

Balanitis in a more advanced form presents well-marked features. The glans and prepuce are swollen, and when the latter is retracted a mottled surface of shining whiteness, broken by deep-red superficial and irregular excoriations, is seen. In this case in some parts the epithelium still remains, and, having been macerated by the secretions, presents the whitish-pearly look spoken of, while in other parts it is cast off, and as a result the red excoriated patches are left.

In other cases upon retracting the prepuce it is found that the glans or its covering, or both, are the seat of redness and swelling, and that

their surface is covered with minute, closely-packed vesicles, which rupture promptly and give rise to excoriations.

The foregoing, which we may call the simple forms of balanitis, may be promptly cured by appropriate treatment. But should, for any reason, the irritating cause persist, a more severe form of the affection results. With the increase of the redness and swelling the excoriations give rise to exulceration, which may be superficial and covered with thin, soft, greenish crusts, and which is called "exulcerated balanitis." Under unfavorable circumstances these superficial lesions of continuity may become transformed into deeper ulcers, very often indistinguishable from chancroids.

Simple balanitis sometimes assumes a very severe form, particularly in uncleanly persons and in those who have been intemperately treated by caustic applications. The penis, particularly at the glans, becomes very much swollen, very red, and perhaps the seat of ulceration. In some cases the whole penis is involved. In this stage the affection may be mistaken for cancer.

Chronic Balanitis.

In contradistinction to the foregoing acute forms of balanitis there is the chronic form. In general, chronic balanitis is seen in persons beyond thirty years of age. It begins upon the glans and prepuce, which are usually in close coaptation, owing to some abnormality. The inflammation is usually of a subacute character, and shows decided exacerbations and remissions. In this way the affection extends over years. If retraction of the prepuce is more or less possible, a somewhat reddened, thickened, and perhaps slightly excoriated, surface is revealed. Owing to the thickness and lessened elasticity of the prepuce, it rolls back, if at all, with difficulty, and in many instances this procedure is wholly prevented by the development of a fibroid ring at the preputial orifice. Such patients say that they have constant inconvenience with their penis, have much difficulty in cleansing the foreskin and glans, and have recurrences of tolerably mild inflammation. When examined from time to time a decided thickening of the epithelium is seen, together with considerable increase in the submucous connective tissue. The parts then have a bluish-white, milky-looking surface, which rarely becomes frankly red, owing to the fact that the blood-vessels have been narrowed by the general condensation of the mucous membrane. To the touch such a glans and foreskin feel firm, somewhat like wash-leather, and, as time goes on, turgescence of the end of the penis is never complete. Unless in such a case circumcision is performed, the growth of the epithelial covering of the glans increases and much diminishes its size, and very frequently it so compresses it

that it levels the corona until it is continuous in line with the fossa.

Not only are these cases distressing in the discomfort and suffering incident to the progress of the affection, but they are also attended with much gravity, since as years increase there is a decided tendency for them to undergo malignant degeneration.

Causes.—In most cases balanitis is due to uncleanliness, and results from the decomposition of the epithelial matter which is formed in the crypts seated in the mucous layer of the prepuce. Excess in coitus, coitus with a woman with a small vulvar orifice or with one suffering from leucorrhœa, and masturbation, are frequent causes. The existence of vegetations under the prepuce is a frequent cause of balanitis, and the lodgement of gonorrhœal pus in that position also causes it. In some cases the gonorrhœal discharge excites inflammation at the preputial orifice, which extends to the prepuce and glans. Chancroidal pus and the secretions of primary and secondary syphilitic lesions, and these lesions themselves, are also prolific causes of balanitis.

Micro-organisms play an important part in the development of balanitis.

Diabetic Balanitis.

In rare cases balanitis may complicate diabetes. The subjective symptoms of this form are quite similar to, but more intense than, those of ordinary balanitis. The patients complain of severe, even atrocious, itching and burning sensations, comparable to those of pruritus vulvæ, and the mucous membrane looks œdematous, and of a color midway between red and violet. A profuse purulent secretion is constantly seen, together with flakes or masses of smegma and micro-organisms which look like croupous exudation. The surface of the glans and prepuce may present a number of ulcerations, and at the free border of the prepuce small radiating ulcers frequently form. In severe chronic cases vegetations appear as complications.

The **course** of the disease is essentially chronic, and as a result of the inflammation and of the ulcers at the end of the prepuce well-marked phimosis may be caused. In very severe instances the ulcers lead to gangrene.

In some cases the occurrence of balanitis is the first evidence of the existence of diabetes. Whenever, therefore, these conditions pointing to a local evidence of this disease are observed in persons who had previously not suffered from any trouble of the penis, particularly in those of middle or old age, the suspicion of diabetes should be entertained and a full examination made.

Croupous and Diphtheritic Balanitis.

This form of balanitis is usually a sequela or complication of wounds or of operations upon the prepuce.

The clinical appearances consist in redness and swelling of the parts, with superficial excoriation, over which a whitish membranous exudation as thick as writing-paper is seated. Usually the membrane is readily stripped off, and healing will follow the observance of cleanliness and the application of a mild lotion.

Diphtheritic balanitis is sometimes observed during or following diphtheria, scarlatina, measles, variola, typhoid fever, and other infectious diseases. The local affection usually originates in simple balanitis resulting from want of cleanliness and care in the removal of smegma and of decomposing urine.

The membrane in this form of balanitis resembles that of diphtheria of the mucous membranes. It is of a yellowish or dirty grayish-white color, sometimes as thick as blotting-paper, and is with difficulty removed from the underlying parts, from which hemorrhage may be caused by the operation. The glans and prepuce are reddened and swollen, and may even become phlegmonous. In bad cases the inguinal ganglia are swollen. Diphtheria sometimes attacks the circumcision-wound in young infants.

Balanitis in Syphilitic Subjects.

In the early stage of syphilis, coincidently with the erythematous or papular rash, balanitis is not uncommon in persons having long and tight foreskins, particularly if they are careless in the matter of cleanliness. With the erythematous syphilide one or more round or oval deep-red excoriations are developed, which, as a result of uncleanliness, may invade the whole glans and prepuce. Mild and ephemeral in its course as this specific balanitis is in cleanly subjects, it may, owing to inattention, be followed by ulceration and diffuse thickening of the parts.

Complications.—While balanitis may result from phimosis, the latter may be produced by balanitis. Paraphimosis may also result from inflammation of the prepuce and glans.

Lymphangitis of a mild or severe type is not at all infrequent in severe balanitis, and is quite common when that affection is complicated with chancroids and various syphilitic lesions, also with gonorrhœa and vegetations. In mild cases the lymphatic vessels feel like cords under the foreskin. In severe cases the whole penis becomes of a deep red color, greatly swollen, œdematous, and the seat of severe pain—a condition incorrectly called "penitis." In these cases phlegmonous abscesses

may form under the skin. Following lymphangitis of balanitic origin, inflammation of the inguinal ganglia, and even suppurating buboes may result.

Not infrequently, particularly in uncleanly persons in diabetics, also in those debilitated by disease or excesses, gangrene of the prepuce occurs from balanitis. Owing to the inflammation of the parts and swelling of the glans, a black spot forms about the middle of the prepuce, and through the buttonhole-like opening which results the glans protrudes. (See Fig. 74.)

Fig. 74.

Gangrene of prepuce, with buttonhole-like opening for glans.

In cases of recurrent attacks of acute balanitis thickening of the submucous connective tissue is not at all uncommon, and may at times present points of resemblance to syphilitic or infecting balano-posthitis. In some cases of acute balanitis well-defined, freely movable, flat plates of thickened submucous tissue of various sizes and extent, which can be readily grasped between the thumb and forefinger, may be felt.

Diagnosis.—In mild cases the diagnosis of balanitis is readily made upon retraction of the prepuce. However, when there is difficulty of retraction, the case may be mistaken for gonorrhœa. If the orifice of the prepuce is large enough to allow inspection of the meatus, the parts can be carefully wiped, and then, when pressure is made upon the under surface of the urethra, if gonorrhœa is present pus will exude from the meatus. If it is suspected that both balanitis and gonorrhœa are present, the meatus may be carefully plugged with a little ball of cotton, and then the prepuce may be compressed from behind forward. In this way a correct conclusion may be reached.

Herpes progenitalis, especially when, from any cause, accompanied with much hyperæmia, may at first be mistaken for balanitis, but the history of the case may be of aid, and upon subsidence of the inflammation the sharply-limited margins of the vesicles will reveal the nature of the affection.

The most difficult task, very often, in the diagnosis of balanitis is to determine whether or not chancroids or hard chancres lodged under the prepuce are at the bottom of the trouble. Chancroidal ulcers may have been seen before the phimotic balanitis had developed, and then its

origin is clear. But in many cases, from carelessness or ignorance, patients can give no history of a chancre or chancroid. Subpreputial chancroids are attended with much more severe and rapid inflammation than simple balanitis. The pus becomes very copious, less thick and creamy than in simple affection, and commonly of a rusty color. Soon the distal end of the penis becomes swollen, in shape like an Indian club, and of a dusky-red color and very frequently chancroids are developed by auto-inoculation around the preputial orifice.

Subpreputial hard chancres producing phimosis may be mistaken for simple balanitis. This complication, as a rule, is much less active in its nature than chancroidal phimosis. The infection increases slowly, usually with much less secretion of pus, it being at first very often a sero-pus. The œdema increases slowly, is more aphlegmasic or less red, but rather firmer. The diagnosis is usually soon cleared up by the development of the indurated ganglia in the groin, and perhaps by the induration of the lymphatics and veins of the penis. In very many cases it is possible, upon careful palpation, to determine the presence of a well-defined induration under the prepuce. It must be remembered that subpreputial vegetations also grow slowly, produce phimotic balanitis, and feel like hard chancres under the prepuce. The secretion accompanying them is profuse and of a disgusting odor, the inflammatory reaction is rather late in appearing, and the lymphangitis and adenitis are less common and of a more inflammatory nature than in the phimotic balanitis of hard chancre.

It is sometimes a difficult question to decide whether in a given case phimotic balanitis is caused by chancroids or vegetations, and sometimes it can be done only after incision of the prepuce.

Prognosis.—In general, the prognosis of balanitis is good. When due to chancroids, besides the destruction of the prepuce and glans—and perhaps of the urethra—which is so liable to occur unless proper treatment is instituted, chancroidal ulceration in the lymphatics and chancroidal buboes may result. Hemorrhage also is very common and often very persistent, and phagedena may be produced. Balanitis from hard chancres may result in more or less destruction of the prepuce and glans, compression and stenosis of the urethra, and phagedena.

Balanitis caused by early syphilitic lesions is easily cured if early recognized and properly cared for.

The balanitis of elderly persons, with its epithelial hyperplasia, is the source of great annoyance from the discomfort produced and the hindrance to proper cleanliness, and is of positive danger in the tendency which it induces to epitheliomatous degeneration of the prepuce, glans, and penis.

Treatment.—Rigid antisepsis is the first essential in the treatment

of balanitis. Mild cases may be readily relieved by practising scrupulous cleanliness and by interposing lint or absorbent cotton soaked in boiled or distilled water between the prepuce and glans. When there is much excoriation nitrate-of-silver solution (1 or 2 : 500) is often very efficacious, or 1 : 100 aluminum-acetate solution may be used. Lead-water and laudanum may be applied if there is much inflammation.

Solutions of sulphate or acetate of zinc (1 : 100) or saturated boric-acid solution are sometimes very curative. Aromatic wine and lime-water may also be recommended.

In many cases dry dressings with boric acid, calomel, subnitrate of bismuth, nosophen, aristol, and orthoform, and a pledget of lint or absorbent cotton are very beneficial.

In diphtheritic balanitis it may be necessary to apply strong tincture of iodine sparingly.

Balanitis resulting from early syphilitic lesions is much benefited by the use of black or yellow washes, which are also beneficial in many cases of simple balanitis.

Copious and frequent ablutions of the parts should be practised several times a day, and when there is any tendency to phimosis frequent injections of hot water slightly alkalinized by borax, or a mild solution of alum, or dilute lead-water, or a solution of bichloride of mercury (1 : 2000 to 5000) or of carbolic acid (1 : 200), should frequently be made.

In most cases of chronic balanitis, particularly in elderly men, circumcision is urgently indicated, since through it alone can permanent relief be obtained.

HERPES PROGENITALIS.

Herpes progenitalis, by some incorrectly called "herpes preputialis," is a mildly inflammatory affection, consisting of one or more vesicles or groups of vesicles. It occurs in both sexes, and is perhaps quite as frequent in the female as it is in the male sex. In men it occurs most frequently on the inner surface of the prepuce, in the sulcus behind the corona, on each side of the frænum, on the lips of the meatus, on the free margin of the prepuce, upon the integument of the penis, and upon the pubic region. In general, the vesicles are unilaterally placed, though they may be symmetrically developed, or those seated on one half of the organ may encroach on the other half.

In women herpes progenitalis occurs on the inner aspect of the labia majora, on all parts of the labia minora, on the vestibule and prepuce of the clitoris, at the orifice of the urethra, and occasionally on the outer surface of the labia majora and on the mons Veneris.

Development and Course.—The evolution of the affection may

occur without any prodromal symptoms whatever: sometimes it is antedated by various neuralgic phenomena, but in most cases there are slight burning, heat, tickling, and itching just before the outbreak. In nervous and chlorotic women an intense pruritus often begins with, and lasts during, the attack. General morbid states seem to have little influence on the evolution of this affection.

The eruption may consist of a single vesicle or it may consist of a group closely packed, or, again, of a number of scattered vesicles, usually following the course of a nerve. The first morbid change observed is a red spot, which is soon the seat of vesicles. These lesions may be of the size of a pin's head or of the diameter of a line, and are rounded, translucent vesicles containing clear serum. When seated on the mucous membranes they, owing to the succulence of the parts and thinness of the epidermis, soon rupture; indeed, it is very rare to see such lesions intact. When seated on the skin, however, they may remain intact for some days, and unless scratched their contents become turbid and they dry into brownish scabs. Rupture of the vesicles leaves a shallow exulceration corresponding in size to that of the vesicle. Its floor is at first of a deep rosy-red, with a finely uneven surface, and its edges sharply cut as if punched out, and sometimes undermined, but not, as a rule, to the same extent as in chancroid. When there is a group of vesicles, they fuse together and rupture, forming a patch which has been described as having a polycyclical outline. This is comparable to the outline presented by two pieces of three-leaf clover placed base to base, which then has a festooned margin formed by segments of circles.

Usually the vesicles heal in a few days; in some cases they are very persistent, and in others they become ulcerated and indistinguishable from true chancroids. In this state their secretion is sometimes autoinoculable, and in some cases the cause of buboes. (See section on Chancroids.) When seated on an inflamed prepuce and irritated by decomposed smegma or gonorrhœal pus, herpes progenitalis sometimes assumes a more or less destructive tendency. Vesicles may become covered with a thin, blackish, very adherent crust, and thus they may remain indolent with no tendency to healing.

When fully developed there is usually an amelioration or subsidence of the itching, heat, or burning, but somewhat exceptionally the excoriated surfaces are exquisitely sensitive, and the patient shrinks from the slightest touch of them. Uncomplicated cases last from a few days to two weeks. Untreated cases, particularly in uncleanly subjects, are sometimes persistent and rebellious to treatment.

In exceptional cases there are swelling and pain in the inguinal ganglia of the corresponding side. Sometimes, when the vesicles become much inflamed and ulcerated, suppurating buboes occur.

Herpes progenitalis is particularly prone to relapse at longer or shorter intervals. It is seen mostly in young adult subjects, and it rarely occurs in old persons.

Etiology.—Local determining conditions are, as a rule, the exciting causes of the affection. These may be briefly stated as any or all congestions and inflammations, ephemeral or long continued, of various grades, affecting one, several, or all portions of the genito-urinary tracts of both sexes. Thus, following balanitis, particularly when resulting from phimosis, gonorrhœa, chancroids, and hard chancres, especially in severe instances, herpes progenitalis frequently appears. In patients suffering from strictures and those having lesions in the posterior urethra herpes has been known to occur, commonly at or following an exacerbation. Following exploratory operations upon the urethra and bladder, particularly when protracted, herpes of the penis has been found to develop.

As causes predisposing to herpes progenitalis in the male, uncleanliness and decomposition of the sebaceous matter, excessive venery and over-indulgence in alcoholics, hot weather, obesity, and plethora are frequently noted. The neuropathic condition may act as an underlying predisposing cause.

In women as in men, congestions and inflammations, ephemeral or long continued, are always the underlying causes of herpes progenitalis. Prostitutes are those who suffer in greatest number from this affection, due, undoubtedly, to the very frequent irritation of their genital apparatus in coitus. Violence to the female genitals in rape and from excessive size of the penis, and in masturbation, particularly when large and firm substitutes for the penis are employed, often produces herpes of the parts. Vulvitis, vaginitis, simple or severe, are frequently the forerunners of the affection. Congestion of the pelvic organs, dymsenorrhœa, pelvic cellulitis, metritis, inflammation of the ovaries and tubes, and endometritis are likewise occasional excitants of the affection. It is also a frequent forerunner and concomitant affection of menstruation. During this epoch it frequently attacks young girls, young women, and even those of middle age. The attacks may come on every month or there may be intervals of freedom of several months. It is perhaps rather more frequent in sexually-inclined and neurasthenic women. As in men, so in women, herpes progenitalis is seen in early and late adult life, and found to relapse in the same exasperating manner.

It is probable that in all cases of herpes progenitalis disturbance occurs in the nervous arc which exists between the genital apparatus and the spinal cord, and that irritation is transmitted from the external or deep portions of the genital apparatus backward to the spinal nerve-centres, and from these conveyed to some portion or portions of the

penis, vulva, or mons Veneris. Clinically, many cases of herpes progenitalis present features of similarity to herpes zoster, even to the point of being coexistent with it.

Diagnosis.—Usually, the diagnosis of herpes of the genitalia is readily made, but when exulcerated the vesicles may closely resemble chancroid or hard chancre. As a rule, the sensations of heat, itching, and burning, the superficial character of the lesion, its less profuse secretion, and scarcely undermined edges will establish the diagnosis, which may be strengthened by the history of relapses. Further, the very frequent unilateral position and peculiar groupings of the herpes vesicles are important diagnostic aids, while in some cases the arrangement of these lesions in the course of a nerve points undoubtedly to their nature.

Both in its solitary and multiform conditions herpes may resemble the syphlitic chancre in its early and erosive stage (chancrous erosion). There are probably more errors made by mistaking this as yet undeveloped initial lesion for herpes than there are about any other form of the hard chancre. The surface of the chancrous erosion is usually of a deeper and duller red color, even coppery, and its floor is smooth and shining, without any small granulations. Its areola is very slight and of a dull-red color, and there is a general absence of inflammation about the whole lesion. The statement has been made with much positiveness that pressure between the thumb and forefinger of a chancrous erosion will fail to cause a drop of serum to exude from its surface, while if similarly treated a herpetic vesicle gives issue to repeated drops. This diagnostic point, in my judgment should be interpreted in a contrariwise direction. Slight pressure of the chancrous erosion, will cause free exudation of serum, while similar manipulation of herpetic vesicles never produces more than a scanty secretion, so that abundance of secretion is at least presumptive evidence of chancrous erosions.

It is a good rule to be always guarded and reserved in the diagnosis of these minute lesions, particularly in cases in which there is absence of the prodromal and accompanying symptoms of herpes, and especially when the lesion seems particularly insignificant. This point cannot be stated in a too impressive manner. It is these insignificant lesions which usually develop into hard chancres. In like manner, a clear history of antecedent herpes should not embolden the surgeon to speak too confidently of the simple character of its successor. A group of chancrous erosions constitutes what is called the multiple herpetiform chancre, which is liable to be mistaken for a cluster of herpetic vesicles.

Patches of chancrous erosions assume a round or oval outline or irregularly round or oval shape. Herpes progenitalis, on the contrary, has the polycyclic forms with its festooned and segments-of-circles-like

margins, due to the fusion of a group of round vesicles. The multiple herpetiform chancre, however, may present for a few days a typically distinct polycyclic outline.

Treatment.—The first indication is to remove irritation or inflammation from the external and internal parts of the male or female genital apparatus. If any abnormality of the prepuce exists as a predisposing cause, circumcision should be performed as early as possible after the healing of the lesions, since benefit is produced in the vast majority of cases. Any deep-seated urethral trouble or affection of any of the accessory parts of the genital tract should receive appropriate treatment. All sources of irritation of the penis should be avoided, and frequent ablutions in hot water made. Any coexisting dyscrasia—gouty, rheumatic, neurotic, or plethoric—should receive proper attention. Sexual, alcoholic, and dietary excesses should be interdicted.

In women, as far as possible, irritations, congestions, and inflammations should be avoided or removed by appropriate treatment, and the frequent use of douches of hot water should be insisted upon. The health of the patient should be considered, and any deviation from the normal attended to.

In the matter of local treatment it is important to observe the most scrupulous cleanliness of the parts, which should be carefully washed twice daily in soap and water and irrigated with bichloride solution (1 : 2000). In very irritable cases immersion of the penis in very hot water is indicated. In these cases also the lead-and-opium wash is very beneficial.

Black and yellow washes and aromatic wine are very useful applications, and in many cases the red wash (1 per cent. sulphate of zinc dissolved in water and perfumed with compound spirits of lavender) will produce prompt healing. As dry applications, aristol, orthoform, xeroform, antinosine, and europhen may be of service in many cases.

In the somewhat rare cases in which there is tendency to ulceration it may be necessary to resort to the application of iodoform. When the case is treated on rigid antiseptic lines, the tendency to ulceration and inguinal adenitis will be seldom seen.

VEGETATIONS.

Vegetations are papillary new-growths formed by hypertrophy of the papillæ, increase in the epidermis and capillaries, and hyperplasia of connective tissue.

Vegetations are not, in the majority of cases, of venereal origin, though their most frequent sites of development are on or in the neighborhood of the genitals of both sexes, particularly in persons who have had gonorrhœa, leucorrhœa, chancroids, and syphilis, and in pregnant

women. It is incumbent upon the physician to be very careful in the employment of the word "venereal" as applied to warts, for great injustice may be done to patients, male and female, in whom these lesions may be present, but who may not have been guilty of sexual transgression. Their growth is induced and favored on mucous surfaces and at the junction of the skin and mucous membrane, and on thin, delicate skin by uncleanliness, by the decomposition of sweat and of sebaceous matter, and by the presence of gonorrhœal and other kinds of pus. For clearness of description, vegetations may be divided into two well-marked classes: first, the soft, succulent warts of the mucous membranes and mucocutaneous junctions; second, the harder and firmer warts which appear on the skin, particularly near the genitals, since here the two factors essential to their growth—namely, heat and moisture—exist.

Soft Vegetations.

Vegetations, especially of the soft kind, are mostly seen in subjects of from twelve years to adult life, and in the male and female in about equal proportions. As age advances they are less frequently observed, and in middle-aged and old persons they are harder, firmer, and sessile, less vascular, and fewer in numbers, most commonly resembling the chronic seed-warts of the hands.

Vegetations begin as minute reddened erosions of the mucous membrane, which very soon come to look like pinhead-sized, rosy-red, finely-granular papules. In this state they may be mistaken for incipient hard chancres. From this insignificant-looking lesion growths even of vast size spring. When the parts are moist and little attention is paid to cleanliness, they grow rapidly and exuberantly, but where the parts are dried they grow slowly and show less tendency to peripheral development. The close coaptation of parts, with their greater inaccessibility to care and their increased secretions, also favors rapid growth. The pinhead-sized warts already described grow in height and in breadth and form vegetations of various shapes. They may be rounded and sessile or pedunculated or Indian-club- and mushroom-shaped, in which conditions they vary in size from that of a pea to that of a raspberry. Or, instead of growing in breadth, when from the formation of the parts they are subjected to lateral pressure, they grow to a length of an inch and more, and separated they look like so many thin red spears with smooth red sides jutting out and radiating in various directions.

Moderately developed vegetations in the coronal sulcus and on the inner layer of the prepuce are well shown in Fig. 75.

The exuberant development of warts of the sessile and pedunculated or club-shaped forms may result in new growths of enormous size which are called fungating masses and cauliflower excrescences. (See Fig. 76.)

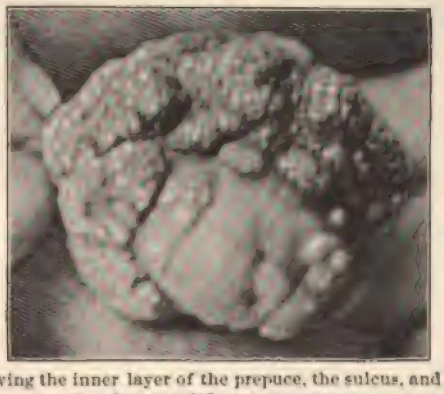
The color of vegetations varies in different subjects and at different times. They may be of the deep red of the cock's comb, or of a purplish red, and when rather small they may be but slightly more pink

FIG. 75.

Soft young vegetations in the coronal sulcus and near frænum.

than the mucous membrane upon which they are seated; frequently they are of a gray or dirty-gray color. Their surface is covered with minute mammillated warty elevations resembling those of the strawberry or raspberry. (See Fig. 76.)

FIG. 76.



Exuberant warts involving the inner layer of the prepuce, the sulcus, and the greater portion of the glans (cauliflower appearance).

Various annoying and injurious mechanical conditions are sometimes caused by vegetations in both male and female. Men having the various malformations of the prepuce, such as smallness of the orifice, straitness and tightness and redundancy, and those in whom the frænum

is short, upon the development of warts on these parts are very liable to phimosis. This complicated condition is often accompanied by much inflammatory action, with a copious flow of pus. Warts thus concealed under the prepuce, the conditions being so favorable, grow rapidly, sometimes pushing forward and out of the preputial orifice, and again they press upward, causing gangrene and perforation of the prepuce.

When seated about the frænum they first cause difficulties in retracting the foreskin, and later on phimosis or paraphimosis.

In women vegetations at the meatus and in the vestibule very often give rise to irritation, often severe in character, spasmodic pains, burning, and a discharge, and sometimes a frequent desire to pass water, and they may act as an impediment to urination. In the vulva and around the introitus vaginæ, besides these inflammatory accompaniments, when small they interfere with the introduction of specula and with coitus, and when excessively large, even to the size of an egg or an orange, they impede urination and effectually block up the vaginal orifice. Cure of such cases often involves partial stenosis of the orifice.

In women warts about the vulva sometimes lead to great hypertrophy and disfigurement of the parts.

Corneous Vegetations.

The hard or corneous warts of the skin may exist alone or follow the successive crops of soft ones which begin on mucous surfaces. They consist of small red, sometimes dirty-brown, sessile, rounded or pointed tumors, quite firm in structure, of an area of a line or more, and of a height of two or more lines. The features are usually very striking and in marked contrast to condylomata of syphilis. In structure they are similar to the soft ones, except that, owing to the nature of the skin, their epidermal covering is thicker, their papillæ shorter, and the connective tissue more condensed. They occur on the penis, on the scrotum, in the crural folds, and about the anus in the male, and on the labia majora, inner surface of the thighs, on the perineum, and about the anus in women. Like those of the soft variety, they increase in great numbers, though more slowly. On coapted surfaces their epithelial covering may be rubbed off, and they then give issue to a sticky, fetid secretion, which, mixed with sebum and sweat, is sometimes copious. Their further course is influenced by the conditions which surround them. If the parts are the seat of heat and moisture, especially if the patient is uncleanly, they grow and multiply luxuriantly; but if they occur on exposed surfaces, and particularly if they are carefully cleansed or dusted with absorbent powders, they may remain quiescent indefinitely. In like manner, the soft warts, when seated on parts which can be kept dry and are either exposed to the air or to the action of absorb-

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Etiology.—Local determining conditions are, as a rule, the exciting causes of the affection. These may be briefly stated as any or all congestions and inflammations, ephemeral or long continued, of various grades, affecting one, several, or all portions of the genito-urinary tracts of both sexes. Thus, following balanitis, particularly when resulting from phimosis, gonorrhœa, chancroids, and hard chancres, especially in severe instances, herpes progenitalis frequently appears. In patients suffering from strictures and those having lesions in the posterior urethra herpes has been known to occur, commonly at or following an exacerbation. Following exploratory operations upon the urethra and bladder, particularly when protracted, herpes of the penis has been found to develop.

As causes predisposing to herpes progenitalis in the male, uncleanliness and decomposition of the sebaceous matter, excessive venery and over-indulgence in alcoholics, hot weather, obesity, and plethora are frequently noted. The neuropathic condition may act as an underlying predisposing cause.

In women as in men, congestions and inflammations, ephemeral or long continued, are always the underlying causes of herpes progenitalis. Prostitutes are those who suffer in greatest number from this affection, due, undoubtedly, to the very frequent irritation of their genital apparatus in coitus. Violence to the female genitals in rape and from excessive size of the penis, and in masturbation, particularly when large and firm substitutes for the penis are employed, often produces herpes of the parts. Vulvitis, vaginitis, simple or severe, are frequently the forerunners of the affection. Congestion of the pelvic organs, dymsenorrhœa, pelvic cellulitis, metritis, inflammation of the ovaries and tubes, and endometritis are likewise occasional excitants of the affection. It is also a frequent forerunner and concomitant affection of menstruation. During this epoch it frequently attacks young girls, young women, and even those of middle age. The attacks may come on every month or there may be intervals of freedom of several months. It is perhaps rather more frequent in sexually-inclined and neurasthenic women. As in men, so in women, herpes progenitalis is seen in early and late adult life, and found to relapse in the same exasperating manner.

It is probable that in all cases of herpes progenitalis disturbance occurs in the nervous arc which exists between the genital apparatus and the spinal cord, and that irritation is transmitted from the external or deep portions of the genital apparatus backward to the spinal nerve-centres, and from these conveyed to some portion or portions of the

penis, vulva, or mons Veneris. Clinically, many cases of herpes progenitalis present features of similarity to herpes zoster, even to the point of being coexistent with it.

Diagnosis.—Usually, the diagnosis of herpes of the genitalia is readily made, but when exulcerated the vesicles may closely resemble chancroid or hard chancre. As a rule, the sensations of heat, itching, and burning, the superficial character of the lesion, its less profuse secretion, and scarcely undermined edges will establish the diagnosis, which may be strengthened by the history of relapses. Further, the very frequent unilateral position and peculiar groupings of the herpes vesicles are important diagnostic aids, while in some cases the arrangement of these lesions in the course of a nerve points undoubtedly to their nature.

Both in its solitary and multiform conditions herpes may resemble the syphlitic chancre in its early and erosive stage (chancrous erosion). There are probably more errors made by mistaking this as yet undeveloped initial lesion for herpes than there are about any other form of the hard chancre. The surface of the chancrous erosion is usually of a deeper and duller red color, even coppery, and its floor is smooth and shining, without any small granulations. Its areola is very slight and of a dull-red color, and there is a general absence of inflammation about the whole lesion. The statement has been made with much positiveness that pressure between the thumb and forefinger of a chancrous erosion will fail to cause a drop of serum to exude from its surface, while if similarly treated a herpetic vesicle gives issue to repeated drops. This diagnostic point, in my judgment should be interpreted in a contrariwise direction. Slight pressure of the chancrous erosion, will cause free exudation of serum, while similar manipulation of herpetic vesicles never produces more than a scanty secretion, so that abundance of secretion is at least presumptive evidence of chancrous erosions.

It is a good rule to be always guarded and reserved in the diagnosis of these minute lesions, particularly in cases in which there is absence of the prodromal and accompanying symptoms of herpes, and especially when the lesion seems particularly insignificant. This point cannot be stated in a too impressive manner. It is these insignificant lesions which usually develop into hard chancres. In like manner, a clear history of antecedent herpes should not embolden the surgeon to speak too confidently of the simple character of its successor. A group of chancrous erosions constitutes what is called the multiple herpetiform chancre, which is liable to be mistaken for a cluster of herpetic vesicles.

Patches of chancrous erosions assume a round or oval outline or irregularly round or oval shape. Herpes progenitalis, on the contrary, has the polycyclic forms with its festooned and segments-of-circles-like

margins, due to the fusion of a group of round vesicles. The multiple herpetiform chancre, however, may present for a few days a typically distinct polycyclic outline.

Treatment.—The first indication is to remove irritation or inflammation from the external and internal parts of the male or female genital apparatus. If any abnormality of the prepuce exists as a predisposing cause, circumcision should be performed as early as possible after the healing of the lesions, since benefit is produced in the vast majority of cases. Any deep-seated urethral trouble or affection of any of the accessory parts of the genital tract should receive appropriate treatment. All sources of irritation of the penis should be avoided, and frequent ablutions in hot water made. Any coexisting dyscrasia—gouty, rheumatic, neurotic, or plethoric—should receive proper attention. Sexual, alcoholic, and dietary excesses should be interdicted.

In women, as far as possible, irritations, congestions, and inflammations should be avoided or removed by appropriate treatment, and the frequent use of douches of hot water should be insisted upon. The health of the patient should be considered, and any deviation from the normal attended to.

In the matter of local treatment it is important to observe the most scrupulous cleanliness of the parts, which should be carefully washed twice daily in soap and water and irrigated with bichloride solution (1 : 2000). In very irritable cases immersion of the penis in very hot water is indicated. In these cases also the lead-and-opium wash is very beneficial.

Black and yellow washes and aromatic wine are very useful applications, and in many cases the red wash (1 per cent. sulphate of zinc dissolved in water and perfumed with compound spirits of lavender) will produce prompt healing. As dry applications, aristol, orthoform, xeroform, antinosine, and europhen may be of service in many cases.

In the somewhat rare cases in which there is tendency to ulceration it may be necessary to resort to the application of iodoform. When the case is treated on rigid antiseptic lines, the tendency to ulceration and inguinal adenitis will be seldom seen.

VEGETATIONS.

Vegetations are papillary new-growths formed by hypertrophy of the papillæ, increase in the epidermis and capillaries, and hyperplasia of connective tissue.

Vegetations are not, in the majority of cases, of venereal origin, though their most frequent sites of development are on or in the neighborhood of the genitals of both sexes, particularly in persons who have had gonorrhœa, leucorrhœa, chancroids, and syphilis, and in pregnant

women. It is incumbent upon the physician to be very careful in the employment of the word "venereal" as applied to warts, for great injustice may be done to patients, male and female, in whom these lesions may be present, but who may not have been guilty of sexual transgression. Their growth is induced and favored on mucous surfaces and at the junction of the skin and mucous membrane, and on thin, delicate skin by uncleanliness, by the decomposition of sweat and of sebaceous matter, and by the presence of gonorrhœal and other kinds of pus. For clearness of description, vegetations may be divided into two well-marked classes: first, the soft, succulent warts of the mucous membranes and mucocutaneous junctions; second, the harder and firmer warts which appear on the skin, particularly near the genitals, since here the two factors essential to their growth—namely, heat and moisture—exist.

Soft Vegetations.

Vegetations, especially of the soft kind, are mostly seen in subjects of from twelve years to adult life, and in the male and female in about equal proportions. As age advances they are less frequently observed, and in middle-aged and old persons they are harder, firmer, and sessile, less vascular, and fewer in numbers, most commonly resembling the chronic seed-warts of the hands.

Vegetations begin as minute reddened erosions of the mucous membrane, which very soon come to look like pinhead-sized, rosy-red, finely-granular papules. In this state they may be mistaken for incipient hard chancres. From this insignificant-looking lesion growths even of vast size spring. When the parts are moist and little attention is paid to cleanliness, they grow rapidly and exuberantly, but where the parts are dried they grow slowly and show less tendency to peripheral development. The close coaptation of parts, with their greater inaccessibility to care and their increased secretions, also favors rapid growth. The pinhead-sized warts already described grow in height and in breadth and form vegetations of various shapes. They may be rounded and sessile or pedunculated or Indian-club- and mushroom-shaped, in which conditions they vary in size from that of a pea to that of a raspberry. Or, instead of growing in breadth, when from the formation of the parts they are subjected to lateral pressure, they grow to a length of an inch and more, and separated they look like so many thin red spears with smooth red sides jutting out and radiating in various directions.

Moderately developed vegetations in the coronal sulcus and on the inner layer of the prepuce are well shown in Fig. 75.

The exuberant development of warts of the sessile and pedunculated or club-shaped forms may result in new growths of enormous size which are called fungating masses and cauliflower excrescences. (See Fig. 76.)

The color of vegetations varies in different subjects and at different times. They may be of the deep red of the cock's comb, or of a purplish red, and when rather small they may be but slightly more pink

FIG. 75.

Soft young vegetations in the coronal sulcus and near frænum.

than the mucous membrane upon which they are seated; frequently they are of a gray or dirty-gray color. Their surface is covered with minute mammillated warty elevations resembling those of the strawberry or raspberry. (See Fig. 76.)

FIG. 76.

Exuberant warts involving the inner layer of the prepuce, the sulcus, and the greater portion of the glans (cauliflower appearance).

Various annoying and injurious mechanical conditions are sometimes caused by vegetations in both male and female. Men having the various malformations of the prepuce, such as smallness of the orifice, straitness and tightness and redundancy, and those in whom the frænum

is short, upon the development of warts on these parts are very liable to phimosis. This complicated condition is often accompanied by much inflammatory action, with a copious flow of pus. Warts thus concealed under the prepuce, the conditions being so favorable, grow rapidly, sometimes pushing forward and out of the preputial orifice, and again they press upward, causing gangrene and perforation of the prepuce.

When seated about the frænum they first cause difficulties in retracting the foreskin, and later on phimosis or paraphimosis.

In women vegetations at the meatus and in the vestibule very often give rise to irritation, often severe in character, spasmodic pains, burning, and a discharge, and sometimes a frequent desire to pass water, and they may act as an impediment to urination. In the vulva and around the introitus vaginæ, besides these inflammatory accompaniments, when small they interfere with the introduction of specula and with coitus, and when excessively large, even to the size of an egg or an orange, they impede urination and effectually block up the vaginal orifice. Cure of such cases often involves partial stenosis of the orifice.

In women warts about the vulva sometimes lead to great hypertrophy and disfigurement of the parts.

Corneous Vegetations.

The hard or corneous warts of the skin may exist alone or follow the successive crops of soft ones which begin on mucous surfaces. They consist of small red, sometimes dirty-brown, sessile, rounded or pointed tumors, quite firm in structure, of an area of a line or more, and of a height of two or more lines. The features are usually very striking and in marked contrast to condylomata of syphilis. In structure they are similar to the soft ones, except that, owing to the nature of the skin, their epidermal covering is thicker, their papillæ shorter, and the connective tissue more condensed. They occur on the penis, on the scrotum, in the crural folds, and about the anus in the male, and on the labia majora, inner surface of the thighs, on the perineum, and about the anus in women. Like those of the soft variety, they increase in great numbers, though more slowly. On coapted surfaces their epithelial covering may be rubbed off, and they then give issue to a sticky, fetid secretion, which, mixed with sebum and sweat, is sometimes copious. Their further course is influenced by the conditions which surround them. If the parts are the seat of heat and moisture, especially if the patient is uncleanly, they grow and multiply luxuriantly; but if they occur on exposed surfaces, and particularly if they are carefully cleansed or dusted with absorbent powders, they may remain quiescent indefinitely. In like manner, the soft warts, when seated on parts which can be kept dry and are either exposed to the air or to the action of absorb-

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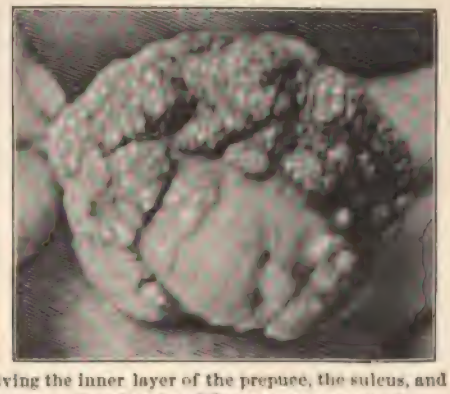
FIG. 76.



Exuberant warts involving the inner layer of the prepuce, the sulcus, and the greater portion of the glans (cauliflower appearance).

Various annoying and injurious mechanical conditions are sometimes caused by vegetations in both male and female. Men having the various malformations of the prepuce, such as smallness of the orifice, straitness and tightness and redundancy, and those in whom the frænum

origin is clear. But in many cases, from carelessness or ignorance, patients can give no history of a chancre or chancroid. Subpreputial chancroids are attended with much more severe and rapid inflammation than simple balanitis. The pus becomes very copious, less thick and creamy than in simple affection, and commonly of a rusty color. Soon the distal end of the penis becomes swollen, in shape like an Indian club, and of a dusky-red color and very frequently chancroids are developed by auto-inoculation around the preputial orifice.

Subpreputial hard chancres producing phimosis may be mistaken for simple balanitis. This complication, as a rule, is much less active in its nature than chancroidal phimosis. The infection increases slowly, usually with much less secretion of pus, it being at first very often a sero-pus. The œdema increases slowly, is more aphlegmasic or less red, but rather firmer. The diagnosis is usually soon cleared up by the development of the indurated ganglia in the groin, and perhaps by the induration of the lymphatics and veins of the penis. In very many cases it is possible, upon careful palpation, to determine the presence of a well-defined induration under the prepuce. It must be remembered that subpreputial vegetations also grow slowly, produce phimotic balanitis, and feel like hard chancres under the prepuce. The secretion accompanying them is profuse and of a disgusting odor, the inflammatory reaction is rather late in appearing, and the lymphangitis and adenitis are less common and of a more inflammatory nature than in the phimotic balanitis of hard chancre.

It is sometimes a difficult question to decide whether in a given case phimotic balanitis is caused by chancroids or vegetations, and sometimes it can be done only after incision of the prepuce.

Prognosis.—In general, the prognosis of balanitis is good. When due to chancroids, besides the destruction of the prepuce and glans—and perhaps of the urethra—which is so liable to occur unless proper treatment is instituted, chancroidal ulceration in the lymphatics and chancroidal buboes may result. Hemorrhage also is very common and often very persistent, and phagedena may be produced. Balanitis from hard chancres may result in more or less destruction of the prepuce and glans, compression and stenosis of the urethra, and phagedena.

Balanitis caused by early syphilitic lesions is easily cured if early recognized and properly cared for.

The balanitis of elderly persons, with its epithelial hyperplasia, is the source of great annoyance from the discomfort produced and the hindrance to proper cleanliness, and is of positive danger in the tendency which it induces to epitheliomatous degeneration of the prepuce, glans, and penis.

Treatment.—Rigid antisepsis is the first essential in the treatment

sary, particularly in those in which there is a urethral fistula in the body of the penis. In other cases removal of the mass of hypertro-

Fig. 79.

Elephantiasis of the penis.

phied tissue may be practised, the incisions being made according to the topography of the parts with a view of getting such flaps as will after healing give a tolerably symmetrical organ. It is the unanimous opinion of operators that even if flaps are taken from the hypertrophied tissue, they do not form the focus of new development.

When the scrotal mass becomes very large and unwieldy it should be removed, excepting such an amount of tissue as may be required to cover the testes.

BENIGN NEW-GROWTHS.

The penis is sometimes the seat of a variety of new-growths, which produce little if any deformity and rarely require surgical intervention.

Milia are not infrequently found in the cutaneous investment of the organ. They require no treatment.

Sebaceous Tumors.—These new-growths are not very uncommonly found scattered over the scrotum, and in some instances a few may be seated in the integument of the penis. When by reason of their size they are objectionable, they may be (after proper sterilization of the parts) removed by incision and enucleation.

Erectile Tumors.—In exceptional cases nævi are found on the penis,

most commonly on the glans. The new-growth consists usually of the flat form of nævus and consists of a patch, bluish or purplish in color—the so called port-wine mark. In some rare cases a tuberous growth of more or less extent and elevation is found, and in very exceptional instances the glans is the seat of well-marked vascular hypertrophy. As a rule, no treatment is required for these cases. Exceptionally electrolysis may be required to cause the excessive growth of vessels to diminish and wither.

A varicose condition of the large veins of the integument of the penis is sometimes observed, but it is rarely of such marked development as to require a surgical operation.

Fatty Tumor.—In very rare instances a fatty tumor has been found in the integument of the penis. Such cases should be treated on general surgical principles.

FRACTURE.

This accident is quite uncommon, and generally occurs in coitus and exceptionally during sleep. It may be complete, the cavernous bodies and spongy body being totally broken or incomplete, in which condition one cavernous body or the spongy body alone may be fractured.

The first symptom is a sudden stabbing pain, and then swelling of the organ rapidly supervenes. When the corpora cavernosa are involved, the swelling is on the dorsum and sides of the penis, and, according to the amount of extravasation of blood, is large or small. Pain, distention, and unwieldiness are prominent symptoms. In some cases the fractured ends have been found, and on motion crepitation has been produced.

Fracture of the corpus spongiosum may occur as the result of a blow on the penis when curved in chordee; it more commonly, however, is the result of violent efforts in coitus, sometimes in the bridal bed, but generally as an incident in a drunken debauch. In the cases of fracture of the spongy body, the parts rapidly swell, owing to the escape of blood, and unless prevented by the prompt use of the catheter, extravasation of urine occurs, in which event the penis becomes greatly swollen from the base to the glans. In cases of urethral rupture retention of urine is a frequent and troublesome symptom.

In some unrelieved cases fever and even pyæmia may be observed, and abscesses, destructive ulceration, and gangrene may occur and lead to the development of urethral fistulæ.

Fracture of the penis is observed in old and young subjects. In advanced life the sheath of the corpora cavernosa is sometimes more condensed and brittle than normal, and it is then more liable to fracture.

found in sclerotic plates; but their details are so unsatisfactory in many particulars that no accurate conclusions can be drawn from their studies. This much may be said—namely, that no evidence of malignancy is found in the development and course of the majority of cases. It must be remembered that operations based on a diagnosis of cancer in these cases are wholly unwarranted in the present state of our knowledge.

Prognosis.—This is very unsatisfactory since there are no authenticated cases on record in which improvement or involution of the sclerosis has been observed.

Treatment.—Little can be done for this affection. Most patients desire at least to make an effort to remove their disability. In this spirit mild blisters, mercurial inunctions, applications of iodine and ichthyol, and the use of the constant current may be tried, and for a time iodide of potassium may be given internally. Such, however, is the uncertainty of ultimate favorable results that one is not warranted in causing these patients inconvenience or suffering.

PRIAPISM.

While in the normal state erections last only a short time, in certain morbid conditions they are, on the contrary, of prolonged duration, and constitute a condition to which the term priapism is applied.

In cases of true priapism the erections are painful, persistent, and irreducible, and are unaccompanied by sexual desire. Much latitude has been accorded to the term priapism, since under it have been classed several orders of cases which really are only instances of slightly prolonged and moderately painful erection, due to an obvious cause. We may divide this affection into the following classes:

1. Priapism observed in infants and children, induced by reflex action in cases of long, tight, adherent prepuce, of stone in the bladder or prostatic urethra, and of worms in the rectum.

2. Priaprism in adult subjects, symptomatic of stone in the bladder, stone in the prostatic urethra, stricture, cystitis, and observed during retention. In these cases the uneasy or painful sensation is felt in the glans penis, while the body of the organ usually is only moderately congested and sometimes curved downward or laterally. This condition disappears upon removal of the cause.

3. Priapism symptomatic of gonorrhœa, with perhaps involvement of the corpus spongiosum and downward curvature. This condition is painful and transitory, and may occur several times during the night. In cases of downward curvature of the penis, due to inflammatory engorgement of the corpus spongiosum and spasm of the musculature of the urethra, the term chordee is applied.

4. Priapism due to ingestion of cantharides, which is a form that is seldom or never seen now, since this drug is so rarely used in medicine.

5. Essential priapism.

It is unnecessary here to consider the first four forms of so-called priapism, as they are merely examples of intercurrent symptoms, usually of short duration, of well-known morbid or structural conditions, and, as a rule, are relieved by operation or medical treatment.

We may divide essential priapism into four varieties:

1. Priapism caused by injury to the spinal cord (either high up or low down), and by blows or violence inflicted upon the perineum;

2. Priapism which is a symptom of cerebral or descending spinal-cord disease;

3. Priaprism which occurs after alcoholic and sexual excesses; and

4. Priapism which comes on a person in ill health, in whom it is difficult to obtain data as to local injury and causation, and in which cases there is now a tendency to look upon leukæmia as the etiological factor.

Priapism after Spinal Injury.

In this form of priapism the traumatism has been found as high up as the cervical and as low down as the lumbar and sacral region. When the injury is in the cervical region it is probable that irritation of the nerves which pass down the cord to the sexual centre is the cause of the trouble, and that the priapism is due to excitation communicated to the erigentes. When the damage is inflicted low down it is probable that the sexual centre is so irritated that it is thrown into a state of chronic excitation, which shows itself in the engorgement of the penis. The course of these cases depends upon the extent and severity of the injury; in some the integrity of the parts is restored and the priapism ceases. In others, death occurs sooner or later.

Priapism in Cerebral and Descending Spinal Disease.

There are a few recorded cases of this kind, and our knowledge of the subject is very unsatisfactory. Cases of priapism coexistent with cerebral and spinal congestion, spinal syphilis, and locomotor ataxia have been reported.

Priapism due to Sexual and Alcoholic Excess.

The greater number of cases of priapism may be denominated alcoholico-erotic cases, since the trouble usually has its origin in a drunken sexual debauch. As a rule, the greater number of those who suffer from this form are young and vigorous men, although medical

annals show that men in middle and advanced life furnish a moderate contingent.

The mode of onset in cases of erotic priapism differs. In some cases there is for a time increased frequency of erections, which are premonitory and last a few or many minutes; in others, after sexual intercourse, the rigidity of the penis remains and becomes persistent; while in still others the patient, on awakening from his debauch, finds that he is suffering from priapism. In most cases when the opportunity exists, these patients endeavor to relieve themselves by coitus, and they always fail. In exceptional cases orgasm and emission, without pleasurable sensations, occur; but, as a rule, there is no sexual desire, and ejaculation is not produced. In fact, it is stated that in several cases the suffering of the patient was materially increased by coitus.

During attacks of priapism the state of the penis has been found to present several variations in different cases. In its most severe form the organ becomes much enlarged, tense, and comparable to cartilage in rigidity, and the seat of severe pain. The glans may be double in size, much distended, and glistening, as if it would burst. The corpora cavernosa are very dense and unyielding to pressure in their whole length, including their crura. The corpus spongiosum is likewise hard and swollen, and its bulbous expansion is in a similar condition.

In some cases the perineal muscles can be felt as dense fibrous bands, and the dorsal vein of the penis seems much distended and feels like a whipcord.

In many of these cases attentive examination reveals very painful spots or perhaps nodules in the corpora cavernosa, particularly toward their root or in the crura. Then, again, digital pressure on the bulb and over the perineal muscles may cause an agony of pain. Spasm of the cremaster muscles may be present, and the testes then are drawn forcibly up to the internal ring. This symptom may be wanting. In some cases there is pain in the lower part of the back and along the course of the spermatic cords. Redness and swelling of the prepuce may be observed as complications. As a rule, the integument of the penis retains its normal color.

In this pronounced condition the sufferings of the patient are very severe, and many authors apply the term atrocious to the pain which is seated in the virile organ. The patients fear the least touch of their linen or of the bedclothes, and jarring of the bed or heavy steps in the room cause them agonizing suffering. They draw up their legs upon the abdomen in order to protect the penis from the slightest touch. This organ may lie rigid against the abdomen, or it may be more or less erect and at a right angle with the body in the horizontal position. Very soon these patients become much worried and apprehensive, and

their faces give evidence of anxiety and suffering. In these cases urination may be accomplished either with little difficulty, or the act may be painful, slow, and halting, with a small sputtering stream, or the patient may have to assume the knee-elbow position in order to expel the urine from the bladder.

The atrociously painful symptoms are usually spasmodic in character, but the attacks may be very frequent and much prolonged, in which event insomnia, nervous exhaustion, and general prostration supervene. In this way the man suffers from day to day, sometimes experiencing very little amelioration of his condition for days or weeks. In many cases, however, there are intervals of comparative freedom from suffering, in which the hyperæsthesia and turgidity of the organ are somewhat diminished and the patient may have some much-needed sleep.

The duration of severe priapism may be from two or three to six consecutive weeks, and even longer.

There is usually no fever, particularly in young, robust men, but in older subjects having leukæmia or visceral lesions pyrexia may be observed.

In contrast to the foregoing very severe forms of priapism we observe cases in which the organ is less tense and distended, and in which the mental and physical suffering is not very severe. In somewhat exceptional cases the patients suffer but little pain, and the discomfort experienced in the turgidity of the organ is the chief symptom.

It is not the rule to find priapism involving the corpora cavernosa and corpus spongiosum at the same time. Some cases have been observed in which the glans and the whole corpus spongiosum have been lax and extensible; others in which the turgescence of one cavernous body was very severe while its mate was more supple, and others, again, in which the rigidity was unequally felt in the length of the corpora cavernosa.

While, as a rule, the invasion of this trouble is prompt, even sudden, and severe, its involution is always slow and often halting, and attended with disheartening relapses. The first sign of improvement is the diminished rigidity of the organ, which soon becomes less painful, and thus the case progresses until the normal state is reached. In that happy event the patient cannot be said to be entirely out of danger, for the reason that recurrences may follow at short or long intervals, particularly if the patient is guilty of sexual or alcoholic indulgence or excess, is subjected to wet or cold, or is constrained to undergo severe bodily exertion.

From the records of the various published cases, the inference seems to be warranted that in about one-half of the cases the patient is left

impotent. It would be unwise, however, to state this as a rule or law, since the publication of cases usually follows quite promptly upon their occurrence. It may be that permanent impotence is induced, or the condition may be of temporary duration. In young and vigorous men it is to be presumed that their virility will later on be re-established.

Etiology.—While the etiology of this form of priapism cannot be clearly stated, certain suggestions may be made as to its causation. In some cases there is strong evidence that damage has been done to the corpora cavernosa, particularly near their roots. This is shown in the tender spots and the hard nodules left after involution of the affection. Then, again, in some cases there is a probability of blood-extravasation into the areolæ of the cavernous tissue. Whether or not in these alcoholico-erotic cases there has been irritation of the sexual centre and of the nervi erigentes, or whether there has been injury to the sympathetic nerve, we cannot say.

In all probability traumatism, though unrecognized, is the essential cause in all cases.

Priapism of Leukæmic Origin. (?)

There is a class of cases of priapism in young men, but particularly in men of middle and advanced life, in which, during and after a more or less prolonged period of ill-health, this symptom appears.

The clinical history of this form is similar to that already portrayed, but in general there is an absence of any data as to excesses of any kind. In this form we find cases with the pronounced agonizing group of symptoms and cases in which lesser degrees of priapism and suffering have been experienced. In these cases there is a history either of neurasthenia, mental worry and depression, or of malarial fever and leukæmia, sciatica, hemicrania, and numbness and cramps in the muscles.

Owing to the fact that leukæmic blood-changes and enlargement of the liver and spleen have been observed in most of these cases, some authors unhesitatingly accept leukæmia as the cause of the priapism, while others speak less confidently. While I am not prepared to deny that priapism may be etiologically related to leukæmia, I am free to confess that on the evidence thus far submitted this relation is in no manner made clear, and the suspicion forces itself upon one's mind that perhaps the occurrence was a coincidence. The trouble with the reported cases is that the antecedent history of the patient has not been thoroughly gone into.

The facts have not been established that there has been no alcoholic or sexual indulgence, or in some cases that injury to the penis has not

occurred. Having the leukæmic explanation in mind, this thought seems to have guided the various authors in their estimate and treatment of the case, and they have failed to pursue channels of investigation which might reveal some local injury to the sexual tract.

Prognosis.—Few definite statements can be made as to the prognosis of priapism of any form. In those cases in which injury to the corpora cavernosa or thrombosis can be made out, incisions may greatly expedite the cure. The existence of spinal disease necessitates a guarded prognosis. In very much run-down neurasthenic subjects, in sexual perverts, and in those suffering from leukæmia the chances are that the priapism will be very persistent, and when it disappears that it will be very liable to undergo relapse.

Treatment.—In surveying the results of treatment of the cases of priapism already published, one is forced to the opinion that nothing like a routine method can be laid down. Remedies which have produced more or less good in one man's hands have failed in those of another. This much, however, can be stated with emphasis: Chloroform narcosis has failed in every case in which it has been used; ice usually does more harm than good; electricity has no value, and may even be harmful; and leeches, to the number of sixteen and forty, have failed to produce any amelioration in the condition of the penis, and have been injurious in their depletory effects.

My own preference is to resort early to moderate and tentative incisions into the most turgid part, or into parts the seat of continuous pain, or into nodular masses, in all probability the result of traumatism. Under antiseptic procedures there is no longer any fear of fever, profuse suppuration, or pyæmia, which were observed in cases treated before the new era in surgery. With a clean, incised wound we need not have the scarring, nodulation, or loss of the tissues of the cavernous bodies, which almost always occurred in former years.

It is always good practice in priapism to use iodide of potassium alone or in combination with mercury when a history of antecedent or present syphilis is elicited.

Bromide of potassium, chloral, belladonna, and morphine may be of benefit, especially during paroxysms; lupuline, camphor, and cannabis indica have been used with indifferent results, and the same may be said of ergot and strychnine.

Of local applications, the following may be found to be beneficial: hot baths, hot and cold spinal douches, sponging with very hot water, spinal cauterization, anodyne poultices, and perhaps ice-bags, but the last must be guardedly used.

Any ephemeral or systemic disorder should be appropriately treated.

GANGRENE.

In rather rare cases the penis is attacked by gangrene which condition may also synchronously or subsequently invade the scrotum and perineum.

Gangrene of the penis is usually observed in its moist form, and, exceptionally, dry gangrene attacks the organ.

The part most commonly affected is the prepuce, and in many cases the lesion is limited to this appendage; but in some cases the whole tegumentary envelope of the penis is destroyed, and in very severe cases the glans and erectile tissues become involved. In the worst form of cases the whole penis together with the scrotum and perineum becomes gangrenous.

This affection may be developed slowly and insidiously without any local or general symptoms, and exceptionally its onset is very brusque and its course rapid and destructive. Gangrene of the penis is first seen as a deep-red spot of varying sizes and as a quite extensive bluish mottling of the skin, upon which there may be bloody blebs. Sooner or later the invaded patch becomes of a purplish color and full sphacelation is then distinctly seen. In favorable cases a line of demarcation is formed at the junction of the morbid and healthy areas, and under treatment the gangrenous tissues slough away or are removed.

Gangrene of the penis is observed in young but more commonly in elderly subjects.

In some cases balanitis, phimosis, and paraphimosis seem to be the starting-points of the trouble; in others, chancroids and chancres in prepuces the seat of phimosis, and large warts seated under a phimotic gland, are the causes of gangrene.

Traumatisms, such as severe blows and compression of the organ by means of rings and bottles and by self-inflicted ligaturing of the parts with string, are sometimes the cause of gangrene of the penis. In some rare cases, fracture of the organ and torsion of it while erect have been known to be followed by this condition.

Certain systemic conditions seem to be the underlying causes of gangrene of the penis. These are diabetes, Bright's disease, chronic alcoholism, typhoid and typhus fevers, erysipelas, intense malaria, smallpox, and a generally vitiated state of the system. In all such cases there is usually a coexistent balanitis, and it is probable that uncleanliness is also a morbid factor. Cases have been reported in which gangrene of the penis was said to be due to the ingestion of ergot and cantharides, and in one it was claimed that atheroma of the arteries of the penis was the essential cause. In some cases, however, it is impossible to fix definitely upon any cause which has so disturbed the circulation that gangrene has resulted.

Prognosis.—No general statement as to prognosis can be made. In the class of cases in which the lesion is due to affections of the prepuce the destructive action may be promptly checked by appropriate treatment. In all patients suffering from infectious, adynamic, and chronic diseases a guarded prognosis must be given.

Treatment.—Gangrene of the prepuce must be treated on the lines laid down for the management of phimosis and paraphimosis (see pages 230, 237). Sufficiently deep incisions should be made in the tense parts to relieve the circulation, and this operation should be followed by frequent and copious irrigations with hot concentrated boric solution or sublimate solution (1 : 2000). In the intervals of irrigation the parts may be enveloped in moist bichloride gauze. Gangrenous patches and tabs may be removed by means of the scissors. Iodoform and iodoform gauze may be employed when the morbid process shows signs of abatement.

It is necessary to sustain the weakened vital powers and to improve the nutrition of the patient by good food and tonics, and to treat all general morbid conditions according to indications.

When the gangrene has extended to the perineum (in which cases micturition is sometimes interfered with and cauterization is impossible) and particularly when it coexists with stricture of the urethra, external urethrotomy should be promptly performed.

CANCER.

Cancer of the penis, according to the statistics from reliable sources, stands seventh in frequency of all cancers in the male sex, and constitutes about 5 per cent. of all cancers in that sex.

In the greater number of cases cancer of the penis begins on the prepuce, in a rather smaller proportion of cases on the glans, sometimes on glans and prepuce, and, again, exceptionally, on the cutaneous sheath of the penis.

Several cases have been reported in which the disease began in the urethral canal a few inches from the meatus and as far down as the bulb.

It sometimes happens that cancer of the penis occurs from extension of the disease from the scrotum.

Etiology.—Besides that unknown factor—tissue-susceptibility or predisposition—and certain unknown conditions (in the majority of cases) incident to age, chronic irritation seems to be the chief cause of cancer of the penis. Since phimosis is a frequent cause of chronic balanitis in which the irritative process is active, this condition takes a prominent place in the etiology of penis-cancer. This form of new-growth, however, is not at all confined to cases of phimosis, but is seen in persons with normally roomy prepuces, and quite rarely in those having

little if any prepuce. In all probability, the personal habits of the man in very many cases have much to do with the development of cancer of the penis. When the organ is kept clean and dry, even in the aged, it is fair to suppose that cancer will not attack it. On the other hand, uncleanliness, with the resulting harboring of decomposed secretions and of dirt, tends to cause a chronic irritative process which may (the condition of the patient's system favoring it) eventuate in malignant degeneration. The occurrence in the majority of instances of penis-cancer in men of the lower walks of life, whose care of the person is generally very scant, seems to warrant the opinion that the disease is largely due to the results of uncleanliness.

Clinical observation has shown that traumatism is occasionally an exciting cause.

Syphilis can hardly be considered other than as a very exceptional etiological factor in cancer of the penis. The scars of chancroidal ulcers may, like those left by syphilitic lesions, cause chronic irritation which may lead to epithelioma.

There are no facts at hand to warrant the assumption that cancer of the penis may more or less remotely originate in heredity.

The subject of protozoa as appertaining to cancer is yet so vaguely understood that speculation upon it is deemed inexpedient.

Course and Symptoms.—In many cases of epithelioma of the penis the initial symptoms are very insignificant, and they may pass unheeded, especially by patients of the lower walks of life. Usually intelligent subjects give a history of a mild pruritus or of a slight burning sensation at the date of onset of their trouble. The truth is, that the condition of the prepuce and the habits of the patient have much to do with the mildness or intensity of early symptoms.

In some cases one or more fissures or thickened patches appear either in the mucous layer of the prepuce, usually the seat of chronic irritation, or at its free margin or in the coronal sulcus. Then chronic rebellious ulceration of a low grade appears, and the parts become more and more hard until a dense, almost ligneous, patch or nodule is developed. From this starting-point large masses of indurated tissue develop, which produce exuberant lesions and much deformity. In these cases there is no evidence of warty or cauliflower growth, but large, irregular, fleshy masses, in the interstices of which a curdy, smegma-like layer, besides pus and a horribly fetid sanies, are secreted. This condition is well shown in Fig. 80, which represents the appearances presented by a case of my own in which the new growths formed a mass as large as a good-sized orange.

The most common mode of origin of epithelioma of the penis is in warty growths, which may promptly, or after the lapse of months and

even years, degenerate into epithelioma. Such is the liability of vegetations to undergo degeneration in those of middle age, and particularly in elderly persons, be they weak or strong, that their presence should immediately demand at the hands of the surgeon prompt removal and treatment.

Then, again, we see cases in which the patient presents a little nodule or a patch of hard, warty growth on the penis, looking something like the seed-warts seen on boys' hands and knuckles. He complains of little if any discomfort, perhaps a little pruritus. This seemingly

FIG. 80.

Cancer of the penis, showing very large fleshy masses.

insignificant lesion grows slowly and in a cold manner, and months and even several years may elapse before it reaches such a size as to become annoying. Then it may be cut out, only to reappear later on in the cicatrix. After that, amputation of the penis is usually performed.

There is still another, but rather rare, mode of invasion and development of cancer of the penis of which I have seen several examples. In middle life and beyond, patients sometimes consult the surgeon for a chronic mildly scaling affection of the glans or prepuce, or both. The symptoms attending this condition are usually not well marked, and they may consist only of occasional slight heat or itching. The morbid areas show slight thickening of the tissues and a constant desquamation of small scales or even lamellæ. This affection often goes on in the most exasperating manner in spite of well-directed treatment, and even in persons whose prepuce is short. Having existed usually several years, the thickening of the tissues becomes greater, and then the new growth more or less rapidly develops and forms large fleshy masses.

In the greater number of cases the disease is localized to the preputial and glandular portion of the penis. The corpora cavernosa, with their firm fibrous structure, offer a strong barrier to the cancerous invasion, which may remain intact for years. Consequently, there is a tendency in most cases to the localization of the disease to the distal portion of the penis. It sometimes develops farther up the organ, its cells having been carried there by the lymphatics. It is rare to see involvement of the whole organ by cancer in the primary attack. But extension may occur by means of the corpus spongiosum, in which case the whole organ may be later on involved. Recurrence of the cancer in the stump often leads to its full involvement, the corpora cavernosa no longer acting as a barrier.

A most annoying complication is the low grade of ulcerative process which goes on in the interstices of the masses and on its surface, and produces a horribly fetid secretion, rendering the patient an object of disgust to himself and those with whom he comes in contact.

With the development of the cancerous growth pain may become a very serious symptom. Owing to compression of the urethra, urination often becomes very difficult and painful. Hemorrhage of greater or less severity is a quite frequent concomitant.

With the full development of the disease, profound cachexia and wasting are developed, which in the end carry off the patient.

Invasion of the Ganglia.—For a greater or less length of time the inguinal ganglia seemingly remain unaffected. We have no reliable statistics, however, showing the date at which cancer attacks these structures. In most cases the patient is seen late in this affection, and then the ganglia are found to be attacked. As a general rule, the ganglia are affected on both sides, and only on one side in about one-third of all cases.

When affected by cancer the ganglia of the groin and also of the thigh become hard, smoothly enlarged, separable from each other, and movable under the skin. They may remain thus for months or for several years. Then, again, exulcerant cancerous development may take place in them, and they may become transformed into large round, oval, or lobulated tumors. This cancerous mass may remain unchanged, but it usually causes ulceration of the overlying skin. Owing to the proximity to the femoral vessels, mild or severe hemorrhages are liable to occur from erosion of their walls by the cancerous growth.

A second order of phenomena may occur in these cancerous buboes. The glands more or less promptly undergo acute inflammation, suppuration ensues, and the pus either forces an outlet or is evacuated by the knife. In most cases the morbid process does not stop with the destruction of the glands. The connective tissue and the skin become the seat

of secondary infection, and there is then produced a formidable cancer in the groin.

Strange as it may seem, tertiary metastasis from the secondary groin-cancer is the exception rather than the rule. It is rare to see general diffusion of malignancy in cancer of the penis.

The involvement of the inguinal ganglia in epithelioma of the penis is inevitably followed by death at an early or late date.

Diagnosis.—The diagnosis of cancer of the penis may be difficult in the early stages of the growth. The existence of chronic or oft-recurring irritation of the glans or prepuce, followed by a localized warty growth or indurated exulcerated patch or nodule, should always excite a suspicion of cancer, particularly in elderly men, and more especially when the existence of syphilis has been excluded. Then, again, the behavior of the lesion under treatment may give a clue as to its nature, for simple processes are usually amenable to proper management, while the malignant forms go on unchecked and uncured. Constant examination of the lymphatic ganglia is necessary, since their enlargement under these circumstances will frequently lead to a correct diagnosis of cancer. Portions of the growth should be examined with the microscope as early as possible.

When seen, as most cases are, late in the development of cancer of the penis, its diagnosis is usually very easy. The large, fleshy, hard masses, their fungating appearance, the distortion produced, and the fetid secretion, all point to cancer of the penis.

Prognosis.—This depends upon the time at which the cancer is seen and its nature recognized. If seen early and the growth is small and favorably situated for removal, its ablation may give to the patient future immunity. If the new-growth is very large and if it has existed for several years, the prognosis is less favorable. In any case the condition of the inguinal lymphatic ganglia gives the most reliable prognostic data. If the glands are but slightly enlarged and show an indolent tendency, a year or many years may elapse before a fatal termination results.

Cancer of the penis is so well localized and so sharply limited in many cases that the conditions for its removal and extirpation are more favorable than upon other regions. Still, the sad fact stares us in the face that in the vast majority of cases cancer of the penis almost inevitably leads to death.

Recurrence of this disease in the stump is not uncommonly seen. Statistics on this point, however, are not sufficiently clear and reliable. This accident probably occurs in about 25 per cent. of all cases.

Pathological Anatomy.—Cancer of the penis is of the epithelioma-

tous variety, being the ordinary skin-cancer involving squamous epithelium.

Treatment.—According to the severity of the case amputation or extirpation of the penis may be necessary.

Too much cannot be said in favor of an early and radical operation in cases of cancer of the penis, since such a course gives the patient a much greater immunity to subsequent trouble.

Amputation of the Penis.

The patient having been prepared for the operation, is placed on his back and a soft-rubber catheter is quite firmly tied around the root of the penis, in order to control hemorrhage. Then two long bonnet-pins are thrust through the corpora cavernosa, sufficiently well behind the tumor on each side, in an X-like manner, avoiding the corpus spongiosum. Before inserting the pins it is necessary to manœuvre and manipulate a little, so as to get the body of the penis back about three-quarters of an inch and to slide the integumentary sheath correspondingly forward. Then, traction being made from the distal and diseased portion of the penis with the left hand or by the aid of an assistant, extension and steadiness are afforded, and a circular incision is made through the integument at the distal portion of the penis, taking care not to cut the corpus spongiosum. Then the corpora cavernosa are cut through downward until the corpus spongiosum is reached. This structure should be carefully dissected out, and fully one-half or three-quarters of an inch should be left to protrude beyond the amputated end of the corpora cavernosa. We then have the latter structures as the stump proper; around it is the ring of integument fully three-quarters of an inch longer than it, and underneath the corpus spongiosum is intact and fully half an inch longer than the stump. At this time the compression is moderately relaxed, and all oozing or spurting vessels are clamped and ligated, one by one, with gut. The next step is the formation of the urethral orifice. In this procedure we should be guided by our knowledge of anatomy. If only one or two, or even three inches of the penis are removed, the incision into the corpus spongiosum, which should be made with scissors, should be vertical, for the reason that thus far the urethra is a vertical slit. Farther down, where the urethra is a transverse slit, the incision should be transverse. In the first case we have vertical, and in the second horizontal or transverse flaps. Then the tegumentary ring should be stitched to the margins of the corpora cavernosa by means of close interrupted silk sutures, leaving the formation of the urethra to the last. Then both flaps of the corpus spongiosum must be stitched with silk, in case they are vertical, to the corpora cavernosa, and if horizontal the upper one should be

stitched to those structures and the lower one to the integument. The wound is dressed with iodoform and surrounded by sterilized gauze kept in place by means of a T-bandage. A soft rubber catheter may be retained in the urethra for a few days, or the urine may be drawn off by means of such a catheter of a calibre of about No. 10 French. It is well for a time to use suppositories of morphine to control erections.

The patient will be confined to his bed for about three weeks. As healing takes place in the stump it is well to watch the new urethral orifice carefully, and, if necessary, to introduce every few days a soft olivary bougie (20 F.). As a result of this operation a good stump is left. There is a redundance of integument beyond the ends of the corpora cavernosa which will admit of erection of the latter without pain or inconvenience. In many such cases coitus is possible after the operation.

The patient whose penis has been amputated should report to the surgeon from time to time, in order that he may see that the urethra remains patulous. Should it be necessary, by reason of contraction, the systematic introduction of an olivary bougie into the urethra may be made every few days or a week for a longer or shorter period.

Extirpation of the Penis.

This is accomplished in the following manner: The scrotum should be split into two halves in the whole length of the line of the raphé, back to the corpus spongiosum. A good sized metal catheter or sound should then be passed as far as the triangular ligament, and the knife inserted between the corpora cavernosa and corpus spongiosum. The latter structure is carefully separated as far back as the triangular ligament if necessary—at any rate, well behind the disease. The sound is then withdrawn, the urethra cut across, and carefully dissected out. In the course of the operation the arteries of the corpora cavernosa and the dorsal artery of the penis are divided, and it is necessary to ligate them. Then an incision is made around the root of the penis on each side up to the central incision below. The suspensory ligament is then cut through, and the crura of the corpora cavernosa are detached from the rami of the pubes by means of the periosteal elevator. If the bone is involved, resection must be performed. The urethra is now brought out, slit up vertically, and stitched to the lower angle of the wound in the scrotum. If the testicles have also been removed, with the purpose of obliterating sexual desire, the urethra is stitched to the lower angle of the perineal wound. The after-treatment requires the observance of rigid antisepsis, the frequent renewal of dressings, and the withdrawal of the urine with a small soft-rubber catheter.

Extirpation of the Ganglia.

In every case of cancer of the penis the inguinal, and perhaps the femoral, ganglia should be thoroughly removed, preferably at the time of amputation of the organ, or a little later on if such delay is imperative. The dissection should be most thorough, and care should be taken not to wound the femoral vessels, the anterior crural nerve, and the saphena vein.

Sarcoma.

This form of malignant degeneration of the penis is usually secondary to the involvement of other parts; it may, however, be primary. As a rule, it begins in the tissues of the corpora cavernosa.

This new-growth attacks both young and old, and sometimes seems to follow traumatisms. The clinical features are the slow, and sometimes rapid, development of a tumor without any painful sensations, which enlarges and distorts the penis. After removal there is always great danger of the return of the morbid process.

Secondary sarcomata of the penis are sufficiently common, and they present, in the main, symptoms similar to those of the primary variety.

The **treatment** is the same as that recommended for epithelioma.

Hypospadias.

This condition consists in a greater or less congenital deficiency of the corpus spongiosum and of the urethra. When the urethra ends at the base of the glans the condition is called balanic hypospadias, and when it ends in the course of the penis between the glans and the penoscrotal angle it is called penile hypospadias. A third and exceedingly rare form of this affection is known as scrotal or perineoscrotal hypospadias, in which the orifice of the urethra is found in the scrotal sulcus (which may have the form of a cleft like a vulva) or in the perineum. It is very rare to find congenital defects in the membranous and prostatic urethra, consequently in all cases of hypospadias the patient has control of his urine. In balanic hypospadias the patient usually ejects the urine in a normal manner, but in proportion as the urethral orifice is situated further back in the penis the stream is weak, and the patient wets his under-linen unless he urinates in the sitting posture.

Treatment.—Balanic hypospadias usually requires no surgical operation except perhaps when the urethral orifice is small, and then a slight incision followed by dilatation will relieve the parts. In most cases of penile hypospadias the functions of the penis are not materially impaired, hence operative measures are not necessary. In some of these

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cases the shortened urethra acts like the string to a bow, and it is then necessary (using thorough antisepsis) to dessect the canal out and to suture it further back in the penis, and thus relieve the parts of the incurvating tension. Plastic operations designed to restore the length of the urethra cannot be given in full detail, since the condition of the parts varies in different cases. In all these operations the surgeon must adapt the incisions according to the indications presented to him. All cases, as a rule, require several operations, and in very many more or less complete failure is experienced.

In cases of scrotal and perineoscrotal hypospadias it is necessary to perform perineal urethrotomy first and thus gain a bladder-drain, then by dissection and plastic operations the deficiency in the urethra may be restored. It is always well in these cases not to hold out to the patient very sanguine hopes.

Epispadias.

In this severe and exceedingly rare form of malformation the urethra opens on the upper surface of an imperfect penis either in its glandular portion in the continuity of the organ or at the symphysis pubis, in which event there is usually ectopia vesicæ.

Treatment.—Cases of epispadias are so rare that they may be called surgical curiosities, and more or less complete failure to remedy the malformation is the rule rather than the exception. When he has decided to operate, the surgeon has his choice between the method of Dolbeau and that of Thiersch, which procedures have in some instances been followed by tolerably fair results.

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CHAPTER XII.

AFFECTIONS OF THE SCROTUM.

CONTUSIONS and wounds of the scrotum, if of a severe nature, are usually associated with more or less injury to the testicle, and therefore require proper support and the usual surgical treatment employed for traumatisms and wounds in general. If the tunica vaginalis has been opened, the greatest care must be exercised in regard to cleanliness, as suppuration of that cavity may be followed by destruction of the testicle.

The scrotum may be attacked by almost any of the various skin diseases which affect other portions of the integument, so for a description of them and their treatment the reader is referred to works on dermatology.

Œdema.—True œdema, or dropsical effusion of the scrotum, is sometimes observed as a manifestation of certain renal and cardiac affections, and also after the too radical removal of the inguinal glands for suppurative adenitis, malignant disease, or tubercular affections.

The **treatment** of œdema depends upon the cause, which, if possible, must be removed. The scrotum should be properly elevated, and the serum evacuated either by massage and pressure, or by multiple punctures, made with all antiseptic precautions.

Emphysema of the scrotum is sometimes observed in cases of urinary scrotal extravasation, when it is due to the liberation of gas from the sloughing tissues, the etiological factor being a septic urine, while sterile urine, as has been shown experimentally, can be injected into the tissues with impunity.

A certain amount of air may enter the loose scrotal tissues in wounds or injuries of these parts, and air or gas may sometimes find its way there from distant wounds which communicate either with the air passages or the intestines.

Treatment.—By free incisions all of the gas, with decomposing urine and sloughing tissues, must be liberated immediately and the parts cleansed with peroxide of hydrogen and hot saline solution, and dressed in the usual manner; the cause of the extravasation being removed at the same time. (See Extravasation of Urine due to Stricture.) Air, or even gas, may be absorbed spontaneously by the tissues, or

PLATE V.

SEBACEOUS CYSTS (WENS) OF THE SCROTUM.

may require a few punctures or incisions, followed by a light protective dressing.

Gangrene.—Gangrene of the scrotum may follow traumatism or extravasation of urine, and may also occur spontaneously without apparent cause. In this latter form the destruction of tissue may be slight or so extensive that the testes are left exposed, the necrotic process involving the penis to a greater or less degree. This form of gangrene is usually encountered in alcoholic, debilitated, and generally run-down and poorly nourished subjects affected with Bright's disease and diabetes, such as are seen mostly in hospital practice.

Treatment.—The patient's general condition must be improved by a nourishing diet, tonics, fresh air, and attention to the bowels. The scrotum should be properly supported and kept scrupulously clean and moist with saline gauze, over which is placed a layer of oiled silk. As the line of demarcation forms, the gangrenous tissues are removed and the subjacent parts cleansed. In this manner it is surprising to see how the great loss of tissue is replaced by granulations which in time cover over the exposed testes.

Elephantiasis of the scrotum will be found fully described on page 254, with elephantiasis of the genitals.

Tumors.—The scrotum may be the seat of cysts, sebaceous cysts (see Plate V.), fatty tumors, fibroma, sarcoma, and epithelioma, the latter being known as "chimney-sweeps' cancer," on account of its frequent occurrence in that class of workers and probably caused in them by the irritation of soot. It usually begins as a small spot of localized induration, which in a short time is transformed into an unhealthy-looking ulcer, with a thin, watery, and foul secretion.

Treatment.—Benign growths may remain for years in the scrotal tissues without causing any trouble whatsoever, but it is always best to remove such tumors, no matter what their nature is or how trifling they may appear. Malignant tumors should be very radically removed, together with the adjacent lymphatic glands.

CHAPTER XIII.

AFFECTIONS OF THE URETHRA.

URETHRAL CALCULI.

OCCASIONALLY one or more calculi are found in the urethra, situated within its bulbous, pendulous, or prostatic portion, just at the peno-scrotal angle, or in the fossa navicularis. They usually have their origin in the kidney as uric acid concretions, which, coming down the urinary tract, become impacted in the urethra, and incrusted and increased in size by the addition of phosphate of lime. They may attain such dimensions as more or less completely to block up or occlude the urethral canal, thus interfering with normal urination or ejaculation, which calls the patient's attention to their presence.

Diagnosis.—Urethral calculi may be felt from without by palpating the under surface of the penis. A metal instrument which is passed through the meatus will be stopped, or will give a grating sensation as it passes along. The endoscope may be used in the examination of these cases.

Treatment.—Under local or general anæsthesia calculi, as a rule, can be removed with a very small and delicate lithotrite, or straight or curved urethral forceps. If, however, this proves unsuccessful, a small opening will have to be made in the bulbous portion of the canal and the stone removed through the wound, which is to be carefully sutured around a medium-sized soft-rubber catheter, which should drain the bladder until the urethral opening is completely cicatrized. A stone in the prostatic urethra can sometimes be pushed back into the bladder with a full-sized sound, and when there grasped with a small lithotrite and removed en masse, or crushed and evacuated as in litholapaxy.

FOREIGN BODIES IN THE URETHRA.

Foreign bodies gain access to the urethra either as the result of accident, due to the breaking of catheters and urethral instruments, or they are introduced purposely for abnormal sexual gratification by persons who are sexually degenerate, these unfortunates introducing every conceivable article that will pass the meatus.

In anæmic and neurasthenic subjects this form of prostatitis is sometimes very chronic, and the continuance of local inflammation leads to the intensification of the general low condition. In many cases, however, brilliant results follow a carefully adapted method of treatment.

Treatment.—The treatment in general is that applicable to posterior urethritis. The health and *morale* of the patient should be improved as much as possible by all hygienic influences. In anæmic and neurasthenic cases iron, quinine, and strychnine are very beneficial, and they may be combined with coca extract. This combination will be found useful in most cases of sexual disorder in which anæmia or neurasthenia coexists.

But in all these cases the existence of the focal inflammation deleteriously reacts on the sexual centre and the general nervous system, and it is of prime importance to cure that. To this end the careful introduction of a goodly sized (20 to 30 French scale) steel sound (chilled in ice-water) two or three times a week, and its retention in the urethra for three or four minutes, will be very beneficial.

Instillations and irrigations of nitrate of silver, permanganate of potassium, or of alum and sulphate of zinc, may be used in most cases with much benefit.

Constipation should be avoided, and coffee, liquors, asparagus, and spiced dishes should not be indulged in.

Bromide of potassium, belladonna, and hyoscyamus may be used with caution to meet the condition of erethism when it arises.

Prostatic massage is not indicated in these cases.

CHRONIC CATARRHAL INFLAMMATION OF THE PROSTATE.

This condition is not very uncommon, and in order to understand it fully it is necessary to be familiar with the general and minute anatomy of the prostate.

In some cases gonorrhœa and in others masturbation is the primary cause. The essential lesions are, first, a round-cell infiltration and hyperæmia in the connective tissue around the gland-tubules; and, second, simple catarrh of the lining membrane of the gland-tubules. This periglandular inflammation is usually continuous with that of the mucous membrane of the prostatic urethra, but in some cases this latter condition may not coexist, or it may be only an insignificant feature.

Histological investigations have shown that in some cases of inflammation of the prostatic urethra only the ducts of the glands have been involved, consequently the parenchyma of the prostate escaped. It has also been shown that one or more groups of gland-tubules may be at-

CHAPTER XIV.

AFFECTIONS OF THE PROSTATE.

CHRONIC inflammation of the prostate is induced by various causes, the most frequent probably being acute and chronic gonorrhœa, the next in order being masturbation and sexual excesses. It may also be due to violence with sounds, catheters, and litholapaxy instruments, to the irritation of a stone in the bladder or of a fragment of stone, or of small stones impacted in its mucous membrane, and to stricture. It is not very probable, as claimed by some, that injections used by patients in the anterior urethra may cause inflammation of the prostate, but very caustic deep injections may be the starting-point of the trouble. (For the description of chronic gonorrhœal congestion and abscess of the prostate, see pp. 98 *et seq.*)

CHRONIC INFLAMMATION OF THE VERUMONTANUM AND PROSTATIC URETHRA.

This form of chronic prostatitis is not very uncommon, and is found, as a rule, in men from about eighteen to twenty-five years of age. The underlying causes are either prolonged masturbation or, rather less frequently, chronic posterior urethritis; or both may be factors. Patients thus afflicted may enjoy tolerably good health, or they may be anæmic or even neurasthenic.

The first symptoms pointing to this prostatic disorder are referable to the sexual system. In those patients who indulge in coitus it is first noticed that they suffer from premature ejaculations. Erections may be firm and desire may be great, but the sexual act is aborted. Then, as time goes on, the erections become less vigorous and the ejaculations are weak and dribbling. Unless relieved, such patients become impotent. Besides these symptoms nocturnal pollutions may trouble the patient, who may also observe the escape of mucus from the urethra after urination or defecation. In some cases a feeling of weakness and depression follows the supposed loss of semen. All these symptoms may be observed in those whose trouble originated from masturbation.

When the emission or ejaculation is examined under the microscope it is, as a rule, found to consist of mucus and granular phosphates; but in some chronic cases immature and dead spermatozoa may be seen in the fluid, together with cuboidal cells, pus, and perhaps calcium oxalate.

When the urine is examined, if posterior urethritis exists, the first few ounces will contain gonorrhœal threads, the second specimen will be clear, and in some instances the third specimen will have a decidedly milky appearance, due to the mucus and granular phosphates which have been expressed by the contraction of the prostate. If, however, after the second cylinder has been filled with clear urine and some of the residuum is still left in the bladder, massage of the prostate will cause a more or less copious flow (one-half to two or three drachms) of a mucus which may be thin and milky or as thick as condensed milk. This secretion may escape from the meatus or it may be voided with the urine. In any event, in this form of prostatitis (and the same is seen in other forms) the dominating component parts will be found to be mucus and granular phosphates. And it may be here stated that this combination is the one which, with more or less admixture of other crystals and of tissue-elements, will be found throughout the course of the various forms of prostatitis yet to be considered. Sometimes mucus escapes which is not mixed with phosphates, but this is not of frequent occurrence. It is most important, therefore, that the surgeon should become thoroughly familiar with the appearance of this muco-phosphatic secretion and with the urine which is so commonly voided by these patients. The urine is usually of low specific gravity (1004 to 1010), neutral, moderately alkaline, or not very acid reaction. It has a pale-straw tint, and it is usually voided in considerable quantities. Much familiarity with these cases will enable the surgeon (if he were so disposed) to make a diagnosis simply from inspection and microscopic examination of the urine. As has been said, the dominating feature of the abnormal discharge is the combination of mucus and granular phosphates.

These patients sooner or later complain of frequent urination; in some it occurs at night, in others in the daytime, and in still others both during the day and at night. Some patients complain of pain in the passage of the urine as if it scalded, or as if a hot iron were in the canal, and it is not uncommon for these patients to experience a dull pain in the glans penis at the end of urination. Some patients have a sensation as if their urine escaped, but examination of the penis shows that it is dry.

Endoscopic examinations of these cases should not, as a rule, be made, since they are usually very painful, and the conditions which they reveal can be determined by other and less severe means. The facts already developed from the endoscopic study of the prostatic urethra in these cases show very clearly that the whole canal is very red and swollen, and this is observed particularly in the verumontanum and the adjacent surfaces.

number found irregularly scattered in both lobes. These lumps are more or less painful. And, lastly, there may be found scattered over the whole prostate half-pea-sized or large-shot-sized prominences, of which there may be two or three or even a goodly number seated on one or both lobes. The discovery of these morbid foci clearly warrants the diagnosis of chronic prostatitis. (In some cases the existence of tuberculosis may be suspected.) In any of the foregoing conditions massage of the prostate will cause certain abnormal mucoid secretions to escape from the meatus or to appear in the urine. These secretions are as follows: 1, that of chronic posterior urethritis; 2, a clear, viscid mucus; 3, mucus and cylindrical prostatic epithelium; 4, mucus (thin or thick and viscid) and granular phosphates (this is the secretion most commonly found); 5, mucus, granular phosphates, and cylindrical epithelium (these are usually found in very recent cases); 6, mucus, granular phosphates, dead and puny spermatozoa, and oxalate of lime; and, 7, mucus, granular phosphates with either triple phosphates or crystalline phosphate of lime. In any of these secretions there may be at some time spermatozoa and pus present.

The essential secretion of all chronic catarrhal prostatic inflammation is mucus in which there is a greater or less admixture of granular phosphates. This secretion in excess attests the activity of the cylindrical epithelial cells lining the tubules, whose function in health is to secrete a thin milky fluid, together with the granular phosphates, which constitute the true prostatic fluid which plays such an important *rôle* in the production of pure, fertile semen. In disease this normal process becomes exaggerated, and as a result we see when examining cases of catarrhal prostatitis the clear viscid mucus, the milky secretion, and that which looks as it escapes from the meatus like a wormy mass of condensed milk. When the prostatic inflammation becomes still more chronic we find the other admixtures which have just been enumerated. It may here be mentioned and emphasized that in most cases of chronic catarrhal prostatitis in young subjects the ejaculation in masturbation is composed mostly of the above-mentioned abnormal prostatic secretion, with or without the other salts or spermatozoa. Further, it is well to bear in mind that the so-called nocturnal pollutions in these cases, the defecation and urination ejaculate, and the secretion which escapes from the urethra after hard work, are all wholly or nearly composed of mucus and granular phosphates. In some cases, owing to causes to be mentioned a little later, some spermatozoa may be found in the ejaculate. With this statement of facts held well in mind (which I have verified in clinical observations and by microscopic studies scores of times), the vague conception of that old-time bugbear of medicine—namely, spermatorrhœa—really becomes an enlightened subject.

In some of these cases there is increased frequency of urination during the day, and perhaps during the night, and there may be more or less uneasiness or pain at the end of the act. In some cases at the end of urination there is marked tenesmus, which may radiate to the pelvis, rectum, and anus, and cause much distress of mind and suffering. These patients, besides uttering their complaints as to prostatic pain and soreness, often become much worried and nervous about their pollutions, which they think will render them permanently weak. Many of them sooner or later present evidences of declining sexual power.

Unless cured by proper treatment these patients continue in an unsatisfactory state for months and years. Some may appear ruddy and healthy, even though they suffer somewhat, and worry; others become decidedly nervous and anæmic, while not a few really become neurasthenic.

In proportion as the mental and physical reaction is severe, so is the case unpromising as to ultimate relief. In general, with the improvement in the urethral and prostatic trouble which proper treatment brings about, the mental and physical condition improves.

Many young men suffering from chronic catarrhal prostatitis make no complaint of symptoms which point to the prostate as the source of their trouble, but lay much stress upon their so-called loss of semen after defecation and urination and bodily exercise, and by nocturnal pollutions. In these patients, as a rule, we find by rectal examination all the tangible conditions of the prostate already mentioned, and microscopic examination of their urine, of their ejaculates, or of the expressed secretion of the prostate will reveal the appearances detailed in the preceding pages. This class of patients usually become very nervous and excited, and from anæmia rapidly pass into a neurasthenic condition, and complain of an infinitude of morbid symptoms. They become sexually weak, while at the same time they are abnormally sexually excited, and the result is sometimes very depressing and discouraging. In many instances great harm results to those patients by their persistence in masturbation, futile attempts at coitus, and dalliance with women. The result in many cases is physical and mental exhaustion.

As catarrhal prostatitis becomes chronic in some cases the morbid process creeps up the ejaculatory ducts and involves the mucous membrane and that of the ampullæ and of the seminal vesicles. The direct result of this extension is a more or less severe catarrhal condition of these parts. But the most striking effect produced is a condition of flabbiness of the outlet ducts of the ampullæ and of the seminal vesicles and the development of more or less patulousness in the not

tacked in an irregularly scattered manner, either on one side or both, and that symmetrical involvement may not occur in one or in both halves of the prostate. The inflammatory process may invade in an irregular manner several groups of glands on one or both sides of the organ, and there may be scattered here and there groups which remain unaffected. This peculiarity of the prostatic inflammation is due to the anatomical arrangement of the tubules, which, in passing into the depths of the organ, remain separate from one another. Thus it happens that the inflammatory process, when attacking a tubule or a group of tubules, runs down them to their blind ends, and thus limits itself and shows no tendency to invade the peripheral parts. In some cases the whole mass of gland-tubules may be attacked. This knowledge will explain to us why in some cases the whole gland is swollen, why in others its surface feels nodulated and lumpy, and in still others presents the sensation as if many good-sized shot were deeply imbedded in the capsule of the prostate. In the first case the glands of the whole organ are quite uniformly attacked; in the second groups of glands are swollen and cause nodulations and lumps on its external surface; and in the third case individual glands scattered irregularly over the organ are the seat of the inflammation which by its limited swelling gives the finger the sensation as if shot were seated in the tissues.

Such are the anatomo-pathological facts and the resulting conditions which are revealed to the surgeon in examining cases of chronic catarrh of the prostate.

The pathological conditions here mentioned may lead to various secondary morbid states, which will be brought out later on.

Chronic prostatitis is observed in the period between puberty and middle age, but mostly between twenty and forty-five years. It occurs in all classes, in the poor and in the rich. Though the morbid conditions in the prostate are nearly the same in all cases, the symptoms presented vary very considerably in different cases. This marked variation in the symptoms allows the classification into certain forms of the disease, the description of which will lead to recognition.

Temperament, habits, and age have much to do with the diversity of the symptoms; but in the chronic course of the disease certain secondary conditions are developed and certain complications may be induced which also give rise to marked symptoms. Thus in many cases the symptom-complex is very striking.

Some patients suffering from chronic prostatitis experience little trouble, and they give themselves scarcely any concern about the matter. Other patients may be troubled more or less in mind, but their health is not seriously affected, while still others become weak and nervous, and even truly neurasthenic. In some cases prostatitis causes no

symptoms, or if present they are unrecognized until some failure of the health occurs from dyspepsia, mental worry, grip, or acute adynamic diseases. After catching cold, standing for a long time in the cold, or sitting on cold stones, the symptoms of chronic prostatitis have first shown themselves. There is clear evidence at hand that chronic prostatitis has lasted many years (five to fifteen) without having caused appreciable symptoms, and its existence was unsuspected by the patient.

Chronic prostatitis runs a long and irregular course, with short or long periods of exacerbation and of remission, in which the symptoms are insignificant, mild, and bearable.

My experience and study have convinced me that the most correct and satisfactory division of chronic prostatitis is, first, that form which is observed in patients between the twentieth and thirtieth years, or thereabouts, and, second, a more advanced form, which is seen mostly in patients beyond the thirtieth year. This division is not at all arbitrary, but is based upon certain quite uniform type-forms.

Catarrhal Prostatitis in Young Subjects.

The symptoms which cause patients of this class to seek relief at the hands of the surgeon may be arranged, for clearness of description, into three categories: first, those of patients who complain of uneasiness in the prostate and perineum and rectum; second, those of patients who, after defecation, urination, and severe muscular exertion, notice a mucous discharge from the penis; and, third, those of patients who complain of some form of sexual weakness.

In some of these cases there is coexistent inflammation of the verumontanum.

Patients who complain of uneasiness and pain in the prostate are mostly those who have masturbated immoderately, or whose trouble began in specific posterior urethritis. Very often the symptom is so slight that it causes no annoyance or impairment of health. In some cases the worry and fret lead to anæmia, and in severe cases neurasthenia may be induced. The pain or uneasiness may be continuous or spasmodic, or it may only be felt after defecation, urination, and severe bodily exertion.

Examination of the prostate by means of the finger in the rectum shows various conditions, as follows: the whole organ may be a little or much swollen in all directions, or but one-half of it (and usually it is the left one) may be the seat of the congestive infiltration. Moderate or severe pain may be produced by pressure, or such may be the extreme sensitiveness of the gland that the patient will not allow it to be touched. Then, again, one lump or many of them may be felt, in most cases, I think, limited to one lobe, and in a smaller

number found irregularly scattered in both lobes. These lumps are more or less painful. And, lastly, there may be found scattered over the whole prostate half-pea-sized or large-shot-sized prominences, of which there may be two or three or even a goodly number seated on one or both lobes. The discovery of these morbid foci clearly warrants the diagnosis of chronic prostatitis. (In some cases the existence of tuberculosis may be suspected.) In any of the foregoing conditions massage of the prostate will cause certain abnormal mucoid secretions to escape from the meatus or to appear in the urine. These secretions are as follows: 1, that of chronic posterior urethritis; 2, a clear, viscid mucus; 3, mucus and cylindrical prostatic epithelium; 4, mucus (thin or thick and viscid) and granular phosphates (this is the secretion most commonly found); 5, mucus, granular phosphates, and cylindrical epithelium (these are usually found in very recent cases); 6, mucus, granular phosphates, dead and puny spermatozoa, and oxalate of lime; and, 7, mucus, granular phosphates with either triple phosphates or crystalline phosphate of lime. In any of these secretions there may be at some time spermatozoa and pus present.

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Unless cured by proper treatment these patients continue in an unsatisfactory state for months and years. Some may appear ruddy and healthy, even though they suffer somewhat, and worry; others become decidedly nervous and anæmic, while not a few really become neurasthenic.

In proportion as the mental and physical reaction is severe, so is the case unpromising as to ultimate relief. In general, with the improvement in the urethral and prostatic trouble which proper treatment brings about, the mental and physical condition improves.

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As catarrhal prostatitis becomes chronic in some cases the morbid process creeps up the ejaculatory ducts and involves the mucous membrane and that of the ampullæ and of the seminal vesicles. The direct result of this extension is a more or less severe catarrhal condition of these parts. But the most striking effect produced is a condition of flabbiness of the outlet ducts of the ampullæ and of the seminal vesicles and the development of more or less patulousness in the not

very strong muscular fibres of the ejaculatory ducts. The process which really takes place in all these parts which normally safeguard the retention of the semen and prevent its escape, is one of weakness and of incompetence, which allows the secretion to escape under various mechanical conditions (abdominal pressure, defecation, particularly with firm fecal bolus, and urination). When, therefore, chronic prostatitis is present with this, as we may term it, seminal incontinence, the abnormal ejaculate is composed of prostatic mucus and some of the secretion of the ampullæ and seminal vesicles. As a rule, the amount of this fluid lost at any time by these patients is very small. The loss of this secretion *per se* is not the cause of the deterioration of the health of the patient, as is so generally believed. The real morbid factors are the local lesions and the resulting mental unbalance and general depression of the economy.

Catarrhal Prostatitis in Older Subjects.

There is no uniformity in the clinical history of the cases of chronic prostatitis in patients beyond the thirtieth year. In some cases the symptoms are few and not well marked; in others they are more pronounced, while in a few so striking is the symptom-complex that prostatic inflammation at once suggests itself to the mind of the surgeon. In these older patients we do not have to listen to so much persistence in the recital of their troubles concerning sexual discharges and the multifarious symptoms of sexual neurasthenia as we do in younger subjects. Older patients may become anæmic, and even more or less neurasthenic, but they rarely reach the deplorable condition so often seen in young subjects. The older patients, as a rule, have started in sexual life with their organs in a healthy condition, and disease has set in later. In the younger subjects the integrity of their sexual organs was much impaired and damaged before and at puberty.

Examination of the prostate by means of the finger in the rectum of these older patients gives somewhat different results from those found in young subjects. The whole prostate may be symmetrically enlarged to as much as double its normal size; only one-half of it may be more or less enlarged, or we may only find one or more well-defined large or small lumps, which, in exceptional cases, may have a soft structure. But in these cases, as a rule, there is evidence of firm structure, even approaching true hardness, and the finger-tip gives the surgeon the impression that marked cell-proliferation must have occurred in the organ. This clinical fact is clearly explained by the results of histological studies, which have shown that with the chronicity of the inflammatory process new connective tissue has been developed around the tubules to such an extent as to produce a semi-sclerotic condition

of the gland. For a long time this new cell-growth causes the decided increase in the size of the gland which has been mentioned, but later on a cirrhotic condition sets in, by which the size of the gland is materially decreased, even to the point of atrophy.

It is sometimes observed that when one lobe of the prostate is attacked there is pain in the corresponding side of the rectum. This condition is also found in some cases of unilateral seminal vesiculitis. In still other cases we find an enlarged, somewhat eburnated organ, which is the seat of firm, half-pea-sized nodulations.

With the continuance of the chronic catarrhal process the lumen of the tubes in many cases becomes more or less plugged up by phosphatic concretions, by desiccated masses of old, cast-off epithelial cells, and by amyloid bodies. Some of these abnormal products may be sometimes observed in younger patients.

Catarrhal prostatitis in older subjects not infrequently gives rise to very poorly marked symptoms. Some patients complain of uneasiness, as they term it, at the neck of the bladder, and others speak of more or less deep pelvic pain, which they think is in some manner connected with the rectum. In some cases the pain is felt on standing up, in others after muscular exertion, bicycle exercise, and horseback-riding, while in still others it is felt when in certain positions on sitting down, particularly on the edge of a chair. In some cases the uneasiness is also felt in the perineum and anus, and in other cases on one side of the body corresponding to the side of the prostate involved. In some cases pain in one hip-joint is complained of. In many of these cases there is frequency of urination, and in some there is pain in the glans penis at the end of the act. Most patients thus affected have some form of sexual weakness, which is either mild or pronounced, and some have abnormal mucoid discharges.

The uneasiness and pain in the prostate may be more or less continuous, or mildly paroxysmal, or it may be rendered worse when the bladder is much distended and when constipation or diarrhœa is present, in which instances there may be decided tenesmus.

Some of these patients speak of a vague feeling of numbness deep in the pelvis and in the prostate, and this feeling may also exist in the perineum. In these cases there may not be much disturbance of the health, though some patients become anæmic and worried.

In marked contrast with the foregoing mild order of cases are those in which the symptoms are numerous, severe, and complex. In these cases there is more or less ill health, and in some neurasthenia. Such patients first complain of vague and sometimes fugitive pains in the back, loins, and pelvis. Inquiry then will usually bring out the statement that there is increased frequency of urination, and perhaps pain in

Examination of these cases with the *bougie à boule* shows the same state of affairs. As the bulb enters the prostatic urethra the already apprehensive patient may experience a severe and even stabbing pain, which causes him to cry out, particularly as it glides over the verumontanum. In many instances, on the withdrawal of the instrument a little blood will be seen on the bulb or at the meatus.

In some cases, when the steel sound is introduced there may be some impediment at the bulb, due to spasm of the compressor urethræ muscle. This, however, is soon and painlessly overcome, and then the tip of the instrument passes into the prostatic urethra, where it may cause at first as much pain as the bulb does. In some cases a powerful spasm of the prostate may be induced, by which the sound is ejected from the urethra, or an orgasm may occur and the same result is produced. As a rule, the great sensitiveness of the deep urethra disappears under careful treatment, and the introduction of the sound then comes to be a source of comfort.

When these cases are further examined by means of the finger in the rectum much important information may be obtained. Careful palpation of the prostate with the finger-tip experiences no enlargement or perceptible change; indeed, no pain may be produced unless deep pressure be made. If, however, the sound is left in the urethra, and then pressure by the finger-tip in the rectum is made, the patient may experience pain, and even cry out in agony.

By this study of the symptomatology, by the consideration of the antecedents and age of the patient, and by the results of instrumental and urinary examination, we are warranted in drawing the conclusion, which has been largely fortified by post-mortem examinations, that such patients are suffering from exudative catarrhal inflammation of the mucous membrane of the prostatic urethra, and that the verumontanum, with its numerous contained mucous tubules and copious nerve- and blood- supply, is the focus of that process. This condition, which is now generally vaguely alluded to as spermatorrhœa, to my mind is a distinct morbid entity; and it may exist, I am positive, without any extension or involvement of the environing prostatic substance or of the sexual parts beyond. Post-mortem studies have clearly proved this condition, which can readily be demonstrated in life if the surgeon has sufficient experience and skill.

This affection, as it becomes very chronic, may lead to catarrhal inflammation of the gland-tubules.

Prognosis.—As a rule, these cases are quite promptly benefited by treatment, provided they will conform to the requirements of sexual hygiene. Sexual and alcoholic excesses prove great drawbacks to a cure and materially interfere with the treatment.

In anæmic and neurasthenic subjects this form of prostatitis is sometimes very chronic, and the continuance of local inflammation leads to the intensification of the general low condition. In many cases, however, brilliant results follow a carefully adapted method of treatment.

Treatment.—The treatment in general is that applicable to posterior urethritis. The health and *morale* of the patient should be improved as much as possible by all hygienic influences. In anæmic and neurasthenic cases iron, quinine, and strychnine are very beneficial, and they may be combined with coca extract. This combination will be found useful in most cases of sexual disorder in which anæmia or neurasthenia coexists.

But in all these cases the existence of the focal inflammation deleteriously reacts on the sexual centre and the general nervous system, and it is of prime importance to cure that. To this end the careful introduction of a goodly sized (20 to 30 French scale) steel sound (chilled in ice-water) two or three times a week, and its retention in the urethra for three or four minutes, will be very beneficial.

Instillations and irrigations of nitrate of silver, permanganate of potassium, or of alum and sulphate of zinc, may be used in most cases with much benefit.

Constipation should be avoided, and coffee, liquors, asparagus, and spiced dishes should not be indulged in.

Bromide of potassium, belladonna, and hyoscyamus may be used with caution to meet the condition of erethism when it arises.

Prostatic massage is not indicated in these cases.

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This condition is not very uncommon, and in order to understand it fully it is necessary to be familiar with the general and minute anatomy of the prostate.

In some cases gonorrhœa and in others masturbation is the primary cause. The essential lesions are, first, a round-cell infiltration and hyperæmia in the connective tissue around the gland-tubules; and, second, simple catarrh of the lining membrane of the gland-tubules. This periglandular inflammation is usually continuous with that of the mucous membrane of the prostatic urethra, but in some cases this latter condition may not coexist, or it may be only an insignificant feature.

Histological investigations have shown that in some cases of inflammation of the prostatic urethra only the ducts of the glands have been involved, consequently the parenchyma of the prostate escaped. It has also been shown that one or more groups of gland-tubules may be at-

tacked in an irregularly scattered manner, either on one side or both, and that symmetrical involvement may not occur in one or in both halves of the prostate. The inflammatory process may invade in an irregular manner several groups of glands on one or both sides of the organ, and there may be scattered here and there groups which remain unaffected. This peculiarity of the prostatic inflammation is due to the anatomical arrangement of the tubules, which, in passing into the depths of the organ, remain separate from one another. Thus it happens that the inflammatory process, when attacking a tubule or a group of tubules, runs down them to their blind ends, and thus limits itself and shows no tendency to invade the peripheral parts. In some cases the whole mass of gland-tubules may be attacked. This knowledge will explain to us why in some cases the whole gland is swollen, why in others its surface feels nodulated and lumpy, and in still others presents the sensation as if many good-sized shot were deeply imbedded in the capsule of the prostate. In the first case the glands of the whole organ are quite uniformly attacked; in the second groups of glands are swollen and cause nodulations and lumps on its external surface; and in the third case individual glands scattered irregularly over the organ are the seat of the inflammation which by its limited swelling gives the finger the sensation as if shot were seated in the tissues.

Such are the anatomo-pathological facts and the resulting conditions which are revealed to the surgeon in examining cases of chronic catarrh of the prostate.

The pathological conditions here mentioned may lead to various secondary morbid states, which will be brought out later on.

Chronic prostatitis is observed in the period between puberty and middle age, but mostly between twenty and forty-five years. It occurs in all classes, in the poor and in the rich. Though the morbid conditions in the prostate are nearly the same in all cases, the symptoms presented vary very considerably in different cases. This marked variation in the symptoms allows the classification into certain forms of the disease, the description of which will lead to recognition.

Temperament, habits, and age have much to do with the diversity of the symptoms; but in the chronic course of the disease certain secondary conditions are developed and certain complications may be induced which also give rise to marked symptoms. Thus in many cases the symptom-complex is very striking.

Some patients suffering from chronic prostatitis experience little trouble, and they give themselves scarcely any concern about the matter. Other patients may be troubled more or less in mind, but their health is not seriously affected, while still others become weak and nervous, and even truly neurasthenic. In some cases prostatitis causes no

symptoms, or if present they are unrecognized until some failure of the health occurs from dyspepsia, mental worry, grip, or acute adynamic diseases. After catching cold, standing for a long time in the cold, or sitting on cold stones, the symptoms of chronic prostatitis have first shown themselves. There is clear evidence at hand that chronic prostatitis has lasted many years (five to fifteen) without having caused appreciable symptoms, and its existence was unsuspected by the patient.

Chronic prostatitis runs a long and irregular course, with short or long periods of exacerbation and of remission, in which the symptoms are insignificant, mild, and bearable.

My experience and study have convinced me that the most correct and satisfactory division of chronic prostatitis is, first, that form which is observed in patients between the twentieth and thirtieth years, or thereabouts, and, second, a more advanced form, which is seen mostly in patients beyond the thirtieth year. This division is not at all arbitrary, but is based upon certain quite uniform type-forms.

Catarrhal Prostatitis in Young Subjects.

The symptoms which cause patients of this class to seek relief at the hands of the surgeon may be arranged, for clearness of description, into three categories: first, those of patients who complain of uneasiness in the prostate and perineum and rectum; second, those of patients who, after defecation, urination, and severe muscular exertion, notice a mucous discharge from the penis; and, third, those of patients who complain of some form of sexual weakness.

In some of these cases there is coexistent inflammation of the verumontanum.

Patients who complain of uneasiness and pain in the prostate are mostly those who have masturbated immoderately, or whose trouble began in specific posterior urethritis. Very often the symptom is so slight that it causes no annoyance or impairment of health. In some cases the worry and fret lead to anæmia, and in severe cases neurasthenia may be induced. The pain or uneasiness may be continuous or spasmodic, or it may only be felt after defecation, urination, and severe bodily exertion.

Examination of the prostate by means of the finger in the rectum shows various conditions, as follows: the whole organ may be a little or much swollen in all directions, or but one-half of it (and usually it is the left one) may be the seat of the congestive infiltration. Moderate or severe pain may be produced by pressure, or such may be the extreme sensitiveness of the gland that the patient will not allow it to be touched. Then, again, one lump or many of them may be felt, in most cases, I think, limited to one lobe, and in a smaller

dition which seems to point to an atonic state of the detrusors. A sense of dulness and weight is often felt in the prostate and in the rectum, and pain and uneasy sensations are experienced in the perineum, thighs, and lumbo-sacral regions.

Some patients suffer from chronic prostatorrhœa without becoming much disturbed in mind by it. But there are others to whom this affection is little less than a calamity. They become exceedingly nervous about their trouble, even to the extent of being melancholy. They lose flesh, strength, and appetite; they become irritable and incapable of mental and physical exertion. In fact, in some cases the whole *morale* of the man seems lost.

In many cases of prostatorrhœa there is more or less disturbance in the sexual function. In some subjects it is morbidly exaggerated; in others there is much desire, much erethism, many erections, but very little is accomplished, owing to the precipitate ejaculations. In still other subjects there is little if any desire, even as a result of much excitement, and the penis and scrotum seem shrunken, cold, and lethargic.

Rectal examination of cases of prostatorrhœa reveals an enlarged organ, usually jutting more or less backward on the gut, and being decidedly broader than normal. Very often only one lobe or a portion of one may be involved. Sometimes it feels soft, and again it may seem decidedly indurated. There is commonly more or less tenderness, even severe pain, on pressure by the finger-tips. Urethral examination, even with a small and not stiff instrument, often causes a great outcry from pain when the tip passes through the prostatic urethra.

Diagnosis.—When the foregoing descriptions of clinical cases are borne in mind the suspicion of chronic prostatitis will force itself upon the surgeon's mind. Then rectal palpation will reveal the extent and severity of the local condition. At the same time the condition of the urine must be examined, and it, with any expressed mucus, must be carefully studied by means of the microscope. If these requirements are fulfilled, a very satisfactory estimate of the case can always be made.

Chronic prostatitis may be caused by tuberculosis, and by the exercise of care and skill a correct diagnosis can soon be positively made. The examination of the urine in these cases for the bacillus tuberculosis will in many true cases be unattended with the detection of the micro-organism. It is absolutely necessary in these cases to examine preferably the expressed or the escaped prostatic secretion after proper staining. Great care should be taken that the penis, and particularly the glans, be rendered absolutely sterile, since upon these parts the smegma-bacillus lives and hibernates, and the detection of this inert microbe might lead

the unwary examiner to mistake it for that deadly bacillus which causes tuberculosis.

But, in addition to the condition of the prostate, the surgeon must make himself familiar with that of the urethra, chiefly its bulbous and prostatic portions, and also of the state of the seminal vesicles and of the ampullations. In forming an estimate of a case it is well to bear in mind that in young individuals a more or less recent gonorrhœa may have existed, and that it is very common to find the damage quite sharply limited to the deep urethra and prostate, and perhaps largely to that gland. It is exceptional to find seminal vesicular involvement in young subjects. In older individuals the prostate and the seminal vesicles and ampullations may be the seat of chronic inflammation, and this complicated condition can be clearly made out by rectal exploration, and by microscopic study of the expressed secretions or of the urinary sediment.

Prognosis.—In very many uncomplicated cases of catarrhal prostatitis most satisfactory results follow the adoption of proper treatment. In every case, if the patient persists in sexual or alcoholic excesses or in any way transgresses against the rules of sexual hygiene, his ultimate cure will be greatly retarded.

In young men suffering from the effects of masturbation and chronic posterior urethritis the prognosis is, as a rule, good, provided the patient is not very anæmic or neurasthenic. In those cases in which the *morale* of the patient is much below par the progress toward cure is slow and often unsatisfactory and halting. The occurrence of cystitis by extension, particularly in chronic masturbators, is of serious import, for such cases are very refractory to the most careful forms of treatment.

In very many older men an excellent prognosis may be given if they can control their sexual tendencies by moderation and will not overindulge in alcohol. The coexistence of chronic posterior urethritis, of seminal vesiculitis, or of chronic inflammation of the ampullæ is a rather serious drawback which may tax the skill and patience of the surgeon. Very many of these cases, however, are much benefited, and even unpromising ones can be cured.

Treatment.—The first essentials in the treatment of chronic prostatitis are a regular, quiet life, abstinence from alcoholics, and the avoidance of all kinds of sexual excess or excitement. A bland nutritious diet should be taken, and spices, coffee, cocoa, highly seasoned dishes, and asparagus should be avoided. The rectum should be thoroughly emptied every day at least once, and if the natural evacuation does not occur a mild aperient must be taken. These patients must avoid taking cold, and they should not take part in violent sports, nor should they indulge in bicycle exercise.

Moderate and rather infrequent sexual intercourse may be practised, provided no ill effects are found to follow it.

When chronic bulbous or posterior urethritis is present active treatment must be instituted for the relief of these conditions, which materially aggravate the case and render it more rebellious. In like manner strictures of the urethra should receive proper attention and treatment. Instillations of nitrate of silver, irrigations with watery solutions of the same salt (1 to 500, 1000, to 2000), of permanganate of potassium (1 to 4000 to 10,000), or of sulphate of zinc and alum (1 each to 500 to 1000), may be given every few days.

In many cases the careful introduction of a steel sound cooled in ice-water, every four to seven days, is most grateful and beneficial. The psychrophor may be used instead of the sound if the surgeon so desires.

Direct treatment to the prostate by the surgeon may be made by means of the finger-tip in the patient's rectum. Preparatory to beginning the treatment of massage of the prostate the surgeon should acquaint himself with the size of the organ and ascertain what part is affected, or whether the totality of the gland is involved. Then the relative softness, bogginess, and hardness should be learned. When the conditions of the organ are ascertained full details thereof should be noted down for future reference and comparison. The main object is to reduce the size of the swollen organ, and by massage we press out pathological products (*vide supra*), stimulate the tissues, and cause the absorption of more or less of the inflammatory exudation, by means, probably, of the increased circulation in the vessels and lymphatics. In addition to these changes, we undoubtedly give tone and resiliency to the flabby bloodvessels and also stimulation to the relaxed muscular fibres. A certain healthy stimulus seems to be communicated to the nerves of the prostate by judiciously administered massage. The technique of the operation is very simple. The patient stands with his feet slightly separated and bends the body forward at a right-angle. Then the surgeon, having liberally greased his forefinger with vaselin, gently inserts it until he reaches the prostate. Then, by means of extended lateral and up-and-down gentle but firm pressure, he thoroughly kneads the organ. Patients act and feel very differently while this operation is taking place. Some cry out with pain, particularly at the first *séance*, others suffer a little and make no complaint, while others are entirely passive and perhaps say that the sensation is a little unpleasant. In some patients partial or full erections are produced, and in almost all of them there is inability to urinate for several minutes after the operation. The secretions which are expressed have already been described.

In most cases prostatic massage produces much benefit and comfort,

but in some it is necessary to proceed very guardedly, lest irritation be set up. No absolute rule can be laid down as to the frequency of repetition of this treatment. In general, one massage in five or seven, or even ten days, will be found sufficient to produce good results. When there is concomitant chronic urethritis of the bulb, posterior urethritis, or involvement of the verumontanum, the patient may be more or less sensitive to this procedure, and it behooves the surgeon to proceed slowly and carefully. The indications for the continuance and the frequency of the massage are the comfort and benefit the patient says he experiences, and also the moral effect, which in many cases transforms a gloomy and foreboding patient into a cheerful and hopeful one. As a rule, when no ill effects are produced, as attested by the feeling of general and local comfort experienced by the patient, when there is no abnormal desire to urinate, and when pus in unusual quantity does not appear in the urine, the surgeon may be certain that he is on the right track, and can continue. He can also gain much information by ascertaining from his records how much involution in the prostate he has produced, and by repeated microscopical examinations in auspicious cases he can convince himself that the pus, effete epithelial cells, granular phosphates, perhaps tube-casts, prostatic concretions, and amyloid bodies are growing less numerous as the patient improves in every particular. During the massage treatment rectal irrigations with very warm water, administered by means of Kemp's instrument, are often of signal benefit in causing the involution of the swollen organ and the absorption of diseased products. In some cases, also, cold water thus administered seems to be very beneficial.

In order to obtain the beneficial effects of heat in the rectum it may be necessary to use water of the temperature of 100° to 120° F. The increase in heat can be accomplished gradually until the higher temperature of 130° F. is reached. When hot water is thus used, many patients from the very first experience great relief and gladly consent to the elevation of the temperature of the irrigations. It is probable that these hot rectal applications prove beneficial by their stimulant action upon the nerves, the bloodvessels, and lymphatics.

The use of cold water by rectal irrigations should be carefully watched, and it should be discontinued at once if discomfort to the patient is produced. The temperature of cold irrigations should range from 50° F. to that of ice-water.

I know of no morbid condition in which such reliable data can be obtained by physical and microscopical examinations of the patient and of his urine as are presented by cases of chronic prostatitis.

Many cases of chronic prostatitis are much benefited by tonic mixtures which contain goodly doses of nitro-muriatic acid combined with

strychnine and quinine. The neurasthenia and weakness which very often occur in the course of chronic prostatitis should be carefully treated. Such patients should receive kindly encouragement, and their general well-being should be sedulously cared for.

In addition to systematic local treatment, much benefit may follow the internal administration of full doses of fluid extract of ergot and strychnine. The muriate tincture of iron combined with strychnine is sometimes very efficient, particularly in debilitated subjects.

It is also well to mention mercurial, ichthyol, and iodide of potassium suppositories, which should be introduced into the rectum every night. The inert basis of these suppositories is a mixture of cocoa-butter and white wax. In each suppository may be incorporated twenty grains of strong mercurial ointment, fifteen to twenty drops of ichthyol, and thirty grains of the iodide of potassium.

LESIONS OF THE EJACULATORY DUCTS.

A variety of morbid conditions may occur in and around the ejaculatory ducts. The plugging up of these minute canals by sympexia is of rather rare occurrence.

It is very probable that the great distention of one ejaculatory duct blocks the other one up very effectually, as these canals lie so close together in the prostate.

Cases have been reported in which, on post-mortem examination, the ejaculatory ducts have been found to be plugged by concretions as large as a pea or a cherry, which were composed of carbonate and phosphate of lime, and mucus and spermatozoa. Chronic gonorrhœa has been found to produce a stenosing condition of the ejaculatory ducts, chiefly by its round-cell infiltration of the submucous connective tissue of the verumontanum, which it attacks more severely than other portions of the posterior urethra. Round-cell infiltration around the ducts producing stenosis has been found in the dead subject.

Dense fibrous bands upon and behind the verumontanum have been seen to so compress or distort the ejaculatory ducts that either stenosis has been produced, or a deviation in the course of the ducts or of their orifices has resulted. In the former event the semen was dammed backward; in the latter it was in coitus thrown backward into the bladder.

Arch-like bands of fibrous tissue have been found seated saddle-like across the summit of the verumontanum, and as a consequence one or both ducts were obliterated. Gonorrhœa may cause abscess-formation in some or many of the prostatic tubules, which may result in such scar-tissue development that the ejaculatory ducts are destroyed.

In some cases of chronic gonorrhœa the involvement of the tubules

of the prostate has ended in cystic degeneration, which was produced by sclerosis of the tissues and obliteration of the ducts.

Cases are on record in which traumatism of the prostate and verumontanum, resulting from the passage of, or retention of, sounds and catheters, has been so severe that the ejaculatory ducts have either been compressed or the direction of their orifices has been thrown so much out of place that they have looked backward to the bladder. This retroversion of the orifices may be partial and only cause them to look upward, or it may be complete, in which event the discharge of semen occurs directly backward.

Displacement of the ducts and of the prostate has been known to follow abscesses of and injury of the perineum (from falls, blows, and infectious processes), which caused a dense fibrous cicatricial mass to draw that gland downward and to much distort the ano-perineal and rectal regions.

In tuberculous inflammation of the prostate the ejaculatory ducts may be compressed or destroyed.

In old men these canals may, when the prostate becomes hypertrophied, either be narrowed or entirely stenosed.

Calculi and concretions in the prostate may cause compression or stenosis of the ejaculatory ducts. It is probable that when many prostatic tubules and their ducts are plugged up by lime, salts, mucus, and amyloid bodies, injurious compression may be exerted upon the ducts.

Abscess of the prostate, with its subsequent cicatricial development and resulting contraction, may utterly obliterate these little canals.

Diminution in size and distortion of the shape of the organ are generally found after abscess of the prostate.

Perineal fistulæ may result from abscess of the prostate, and in this event if the ejaculatory ducts be not obliterated the emission will probably pass through the false passages and ooze out at the perineum.

Permanent aspermatism may result from injury of the ejaculatory ducts in the operations of lateral or bilateral lithotomy.

The **treatment** is that necessary for chronic posterior urethritis.

HYPERTROPHY.

In a goodly number of men at and beyond fifty years of age, and perhaps at an earlier date, the prostate gland undergoes a peculiar form of enlargement, generally known as hypertrophy, which may be moderate in size or it may reach an enormous development. This morbid condition is found in a variety of forms, and is principally important by reason of the mechanical obstruction which it causes to the whole urinary tract. According to the recent extended investigations of Albarran and Hallé into the nature of the growths which constitute

hypertrophy of the prostate, the principal and essential lesion is glandular hypertrophy due to chronic inflammation. The lesions of the fibro-muscular stroma which are also found in these cases, known as fibro-myomatous tumors, are secondary and may form a greater or less part of the enlargement. In some few cases, however, these lesions are found to predominate, and then they may choke the glandular hypertrophy and cause it to disappear. It is the want of knowledge of these pathologic facts which has caused some authors stoutly to maintain that fibro-myomatous overgrowth is the essential process in prostatic hypertrophy. The masses of glandular hypertrophy are mostly found in the triangular-shaped posterior median space (the so-called third lobe) situated between the two lateral lobes, but they may also occur in the latter structures.

The fibromatous and muscular tissue hypertrophy may be inextricably scattered throughout the gland, causing its more or less extensive enlargement; or it may be developed in the form of distinct round or oval tumors having a capsule of fibrous tissue. These tissues may be few or many and vary in size from that of a small shot to that of a marble or walnut.

Glandular and fibro-myomatous tumors may be seated in the substance of the gland, or may be more superficially placed, when they may project either upon its urethral or bladder surface, or on both.

An extended study of this subject in its clinical aspect and in its pathologic results has convinced me that hypertrophy of the prostate is found in four quite well-marked forms, as follows:

Hypertrophy of one or both of the lateral lobes of the prostate, without median enlargement.

Hypertrophy of the median portion of the prostate, without lateral enlargement. (See Plate VI.)

Hypertrophy of lateral portions of the prostate, with the formation of a bar. (See Plate VII.)

Hypertrophy of the lateral lobes and median portion of the prostate, the latter being in the shape of a sessile or more or less pedunculated tumor. (See Plate VIII.)

These abnormal growths produce more or less structural change in the deep urethra. In many cases the mucous membrane becomes very much swollen, particularly in men who have suffered from chronic gonorrhœa or from chronic inflammation and congestion of these parts from masturbation and sexual excesses, and following careless and injurious instrumentation.

It is very important that these swollen and inflamed conditions of the mucous membrane lining the prostatic urethra should be clearly

of the prostate has ended in cystic degeneration, which was produced by sclerosis of the tissues and obliteration of the ducts.

Cases are on record in which traumatism of the prostate and verumontanum, resulting from the passage of, or retention of, sounds and catheters, has been so severe that the ejaculatory ducts have either been compressed or the direction of their orifices has been thrown so much out of place that they have looked backward to the bladder. This retroversion of the orifices may be partial and only cause them to look upward, or it may be complete, in which event the discharge of semen occurs directly backward.

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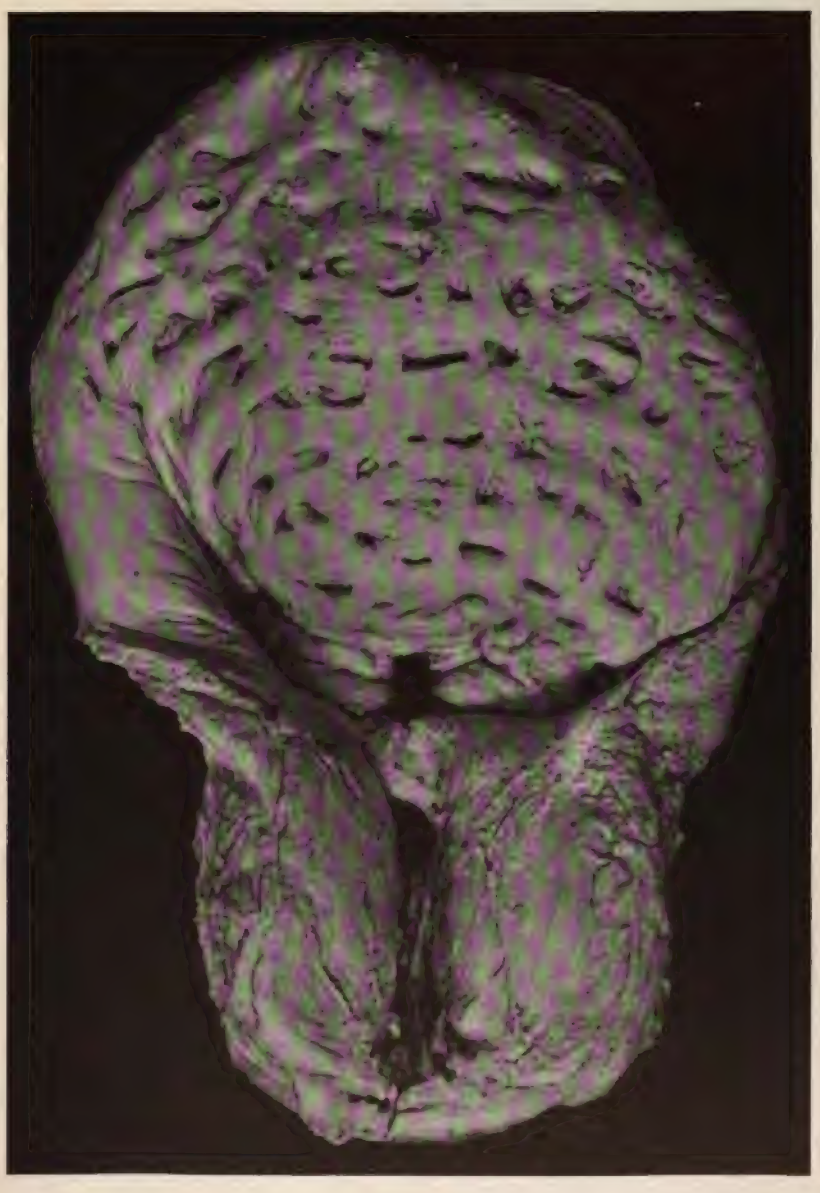
PLATE VII.



HYPERTROPHY OF THE LATERAL PORTIONS OF THE PROSTATE, WITH FORMATION OF A BAR.

(A false passage has been made through the bar.)

PLATE VIII.

EXTENSIVE HYPERTROPHY OF LATERAL AND MEDIAN PORTIONS OF THE PROSTATE,

the latter consisting of a large sessile tumor.

understood, since they quite early cause more or less irritation and difficulty in urination.

When the lateral lobes are enlarged, particularly when one lobe is more hypertrophied than the other, the urethra may become more or less distorted and deviated in its course, and its calibre may be much decreased. In these events the tissues become much condensed and the normal dilatability of the prostate and its urethral segment is lost, and the urethral canal is converted into an unelastic vertical slit. This abnormal firmness of structure of the prostate may gradually tend to produce a condition of patulousness of the vesical orifice (the internal sphincter being powerless), which can never close, and, as a result, urine passes into the prostatic urethra.

The hyperplastic processes in the prostate are arrested at its apex (which may be more or less enlarged) by reason of the resistance offered by the firm triangular ligament; therefore when hypertrophy takes place in the lateral lobes the increase is mainly towards the vesical orifice. The whole organ is thereby much congested (and the urethra is correspondingly elongated) and is pushed upward and rather forward into the bladder. As a result the vesical orifice is elevated above the base of the bladder and two pouches are formed, one being in front of the opening and the other behind it. The anterior pouch is usually small and of little pathological significance, but the posterior one may become very large.

As a consequence of the prostatic stenosis and the dislocation of the vesical orifice, the bladder cannot be emptied and the urine lodges in the post-trigonal pouch. This accumulation of residual urine gradually increases in quantity, and, as it does, the pouch grows larger, so that a very considerable cavity may be formed. (See Plate VI.)

Certain structural conditions of the bladder coexistent with hypertrophy of the prostate are concerned in the formation of the post-trigonal pouch. It is found that behind the trigonum the muscular coat of the bladder and its tissues are thin and weak. Consequently when the viscus contracts and the urinary stream is obstructed, these parts gradually yield and become pouchy.

At the same time that these structural changes are taking place in the base of the bladder, the mucous membrane over the trigonum becomes congested and swollen, and this tends further to hinder the escape of the urine.

Besides the tolerably uniform enlargement of the lateral lobes so commonly seen, these structures may be the seat of glandular and fibromyomatous tumors which jut up into the bladder cavity and prostatic urethra. There may be one or many of these growths (see Plate VI.),

which may vary in size from the dimensions of a bean to those of an orange. In some rare cases very large tumors springing from the lateral lobes have been found to project above the pubes and to seriously interfere with such operations as suprapubic cystotomy or vesical aspiration.

In some cases the enlargement of the lateral lobes takes place toward the rectum and acts as an impediment to defecation. In some of these cases no interference with urination is observed, owing to the extravesical level position of the hypertrophy, while in others the urethra and bladder gradually become involved upon.

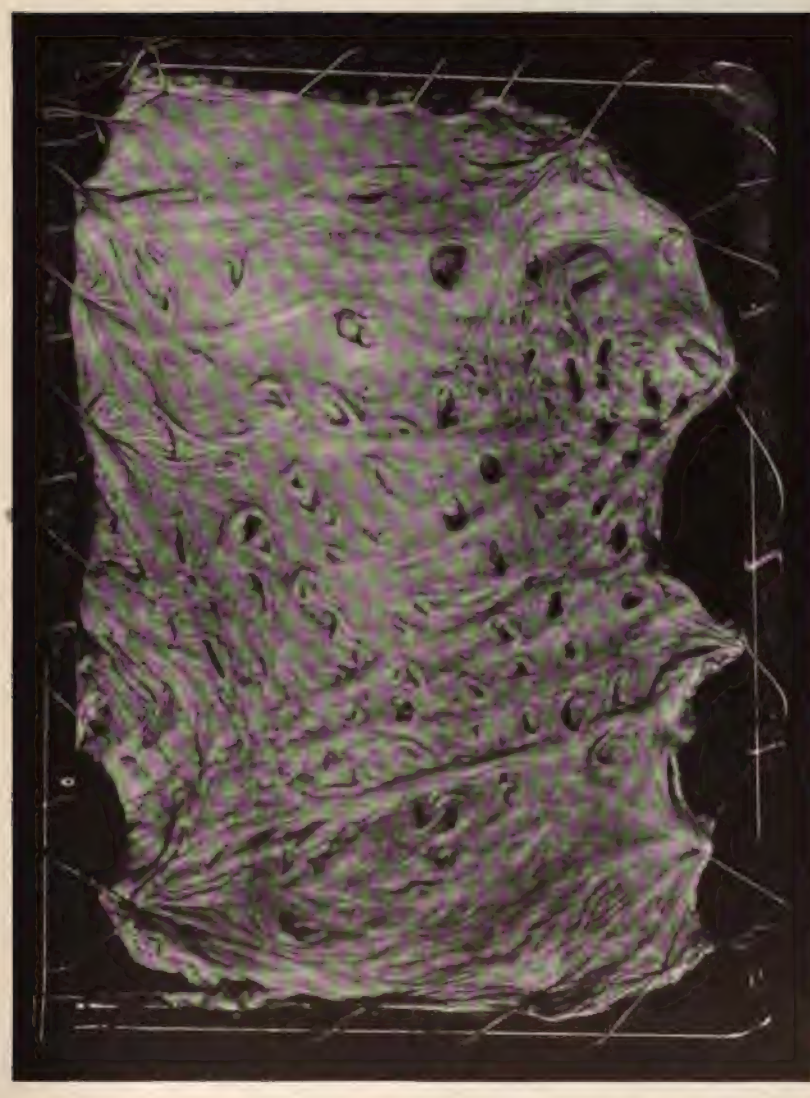
Since the vesical veins empty through the prostate into the general circulation, it follows that enlargement of the gland will cause compression of these vessels. From this condition there results in many cases a state of congestion of the bladder and of the prostate gland, which adds greatly to the seriousness of the case.

The most [illegible] lesions are found at the vesical orifice which may or may not [illegible] the enlargement of the lateral lobes. These lesions are [illegible] the neck of the bladder and as round or oval, [illegible] the same opening. (See Plates [illegible]) The neck of the bladder is not of necessity [illegible] enlargement. It is formed by hyperplasia occurring [illegible] of the uvula vesicæ seated at the apex of the [illegible] the two lateral lobes. The bar consists of hyper[illegible] growth of the sub[illegible] unstriped muscular fibres. [illegible] rather rapid and it soon [illegible] This bar is well shown in Plate IV., in [illegible] of the lateral lobes. It also will [illegible] through the base of the [illegible]

The [illegible] may be quite small or [illegible] at the vesical orifice. [illegible] There is usually [illegible] These tumors begin with [illegible] which is enveloped in a [illegible] membrane. This [illegible] is frequently the seat of chronic inflammation, and as years roll by, so great is the resulting hyperplasia that a tumor as above described, is formed which has been wrongly called the third lobe of the prostate.

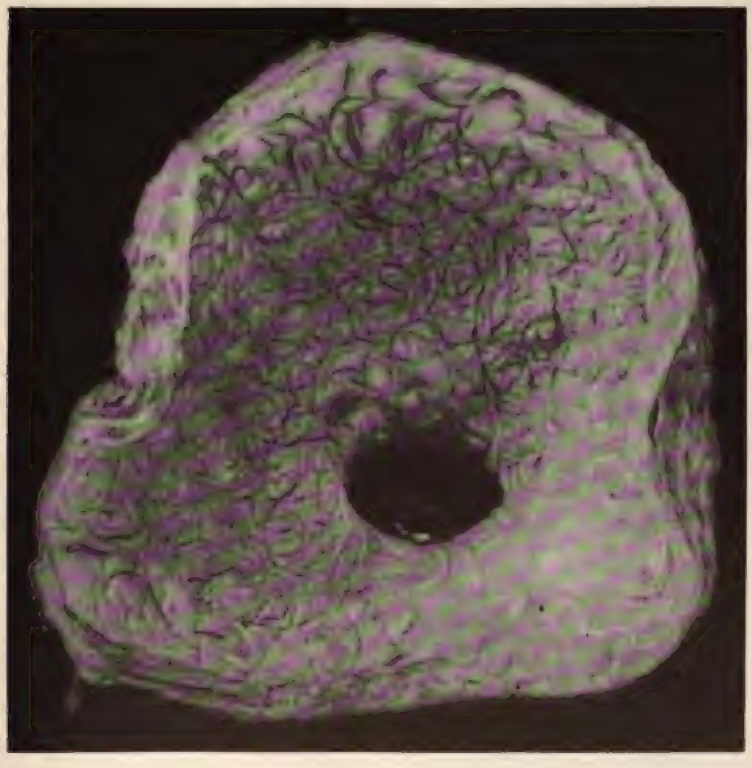
As this glandular mass increases in size, it projects into the bladder more and more until it may hang over the vesical orifice like a valve, and this interferes with or wholly prevents the escape of urine from the

PLATE IX.



TRABECULATIONS AND SACCULATIONS OF THE BLADDER.

PLATE X.



DIVERTICULUM OF BLADDER.

PLATE XI.

HYPERTROPHY OF LATERAL AND MEDIAN PORTIONS
OF THE PROSTATE,

the latter being in the form of a pedunculated tumor on posterior wall of bladder (villous growths encrusted with phosphatic salts).

bladder. The impediment to urination caused by the bar at the neck, by the pedunculated tumors which act like valves, and by the greater or less stenosis, and perhaps by the tortuosity of the prostatic urethra, react upon the bladder and produce in it further important structural changes. In some cases this viscus becomes gradually dilated and thinned from atrophy until its holding capacity is far greater than normal; while in others an increasing condensation and hypertrophy of the entire bladder-wall structure and its perivesical connective tissue takes place and its cavity is then rendered smaller, until in the end it may only hold a few ounces of urine.

With the increasing interference with urination, the muscular fibres of the bladder may become much hypertrophied, so that a striking condition of trabeculation upon the internal vesical surface is produced. (See Plate VI.) In this trabeculated condition of the bladder, protrusions of the mucous membrane from between the bands of hypertrophied muscular fibres and pouches may be developed. (See Plate IX.) In very severe cases true sacculi or diverticula (see Plate X.) are formed which are usually multiple, and may be of the size of a walnut or of an orange, or they may be even larger than the bladder itself.

In many cases when these severe degenerative changes take place, ulceration of the mucous membrane covering the prostatic overgrowths may develop and cause much suffering for the patient. In addition to these changes in the structure of the bladder, it is necessary to remember the post-trigonal pouch already described. (See Plate VI.)

In many cases of hypertrophy with residual urine, calculi are prone to form. These stones may give rise to no symptoms whatever, since they are situated low down in the bladder, below and behind the trigonum, and in urination are not pushed against the very irritable vesical orifice. In some severe cases benign and malignant tumors cause formidable complications. In Plate XI. villous growths encrusted with phosphatic salts are well shown.

In many cases of prostatic enlargement there is synchronous congestion of the rectum, and hemorrhoids are developed which very often greatly aggravate and complicate the case.

Symptoms.—The symptoms of hypertrophy of the prostate vary somewhat according to the part of the organ which is the seat of enlargement and to the early or late involvement of the prostatic urethra.

In cases in which the hypertrophy begins in the outer and posterior portion of the gland, the symptoms may be slow in development and will not be very well marked until the calibre of the prostatic urethra is rendered smaller, or until its mucous membrane has become congested, swollen, and irritable. Many men never have symptoms of hypertrophy of the prostate, for the reason that the new cell-growths are developed at a distance from the prostatic urethra, which does not

become stenosed. On the other hand, when the enlargement occurs in the lateral lobes, particularly when rather near the prostatic urethra, the symptoms may develop rather slowly and insidiously or quite rapidly. Then, again, in the cases in which the hypertrophy begins in the so-called third lobe, or when the vesical bar is developing, the symptoms are observed to appear more or less promptly.

The condition of the prostatic urethra before the onset of the hypertrophy has much to do with the mildness or the severity of the initial symptoms. With the increase in the structural elements of the prostate, there is developed a chronic and hyperplastic congestion of the urethral mucous membrane, which acts as an impediment to urination.

When the prostatic mucous membrane is normal prior to the onset of the hypertrophy, this segment of the urethra may not for a time give rise to symptoms of marked severity beyond a slight impediment to urination, for the reason that there is very little irritability of the parts. But in cases of chronic posterior urethritis the involvement of this segment of the canal occurs quite early and the symptoms are promptly developed.

In some cases difficulty in urination is the first symptom complained of, while in many others increased frequency of the act is the first and the most constant phenomenon. This symptom is especially well marked at night and early in the morning, when the recumbent position tends to produce congestion of the bladder and prostate. But as the case progresses diurnal frequency of urination is also observed. At first the patient may pay little attention to this symptom and look upon it as an unimportant sign of advancing age, but when the intervals of urination become shorter and when the slight initial pain becomes more severe, and the patient's sufferings and discomfort more marked, he realizes that something is radically wrong with him.

The difficulty in urination may increase very slowly or quite rapidly. Patients complain that they experience difficulty in starting the urine, and that when it begins it has little force. It is noticed then that the stream is decreased in size as well as in force, and that it is feeble and halting. Towards the end of the act, there is more or less feeble dribbling. All these symptoms depend upon the urethral stenosis, the atony of the walls of the bladder, and a condition of spasm of the compressor urethræ muscle.

As a rule, the cases of bar or tumor at the vesical orifice are for obvious reasons the ones which suffer earliest and more severely from difficult urination. When the vesical pouch is yet small and the residual urine clean and limited in amount, the symptoms may be rather mild. With the increase in the residuum, decomposition of the urine may occur and severe symptoms may result. The urine, if normal in the

beginning, promptly becomes more or less opaque from the intermixture of pus. In cases of chronic posterior urethritis, pyuria is an early symptom.

The stagnation of purulent urine in the bladder further reacts on its walls and also on the mucous membrane of the prostatic urethra, and as a result these tissues become inflamed, irritable, and painful; and in consequence, the desire for urination is still more frequent and imperative. With the continuance of the pyuria, the urine becomes much decomposed, alkaline from decomposition of the urea, loaded with ropy pus, and of very offensive odor. In this state, calculi may form in the post-trigonal pouch, and phosphatic concretion may develop in the trabeculations and in the sacculi or diverticuli and perhaps on the excoriated or ulcerated spots. When cases have progressed to this serious state, the inflammatory and infective processes may spread up the ureters and involve the pelves of the kidneys and the parenchyma of these organs. In many cases patients suffer from mild or severe pain in the penis, particularly at the glans, and in the testes and scrotum. There also may be dull, aching pains in the perineum, bladder, and rectum, particularly when the body is jolted. Many patients complain of uneasy sensations and of dull pains in the sacral, hypogastric, and lumbar regions, which they wrongly attribute to rheumatism and lumbago.

In somewhat exceptional cases, the bladder walls become enormously thickened and the bladder cavity contracts until it holds little if any urine. The vesical symptoms are usually quite severe, the bladder becomes very irritable when only a small amount of urine is secreted, the desire to urinate is incessant, and the pain very great. There is no residual urine in these cases.

In many cases of hypertrophy, hematuria occurs. It may be mild or severe in character. Its occurrence may be infrequent or it may be very persistent. Occasionally the passage of instruments, even when carefully introduced, gives rise to hemorrhage, while in many cases the strong and constant expulsive efforts of the bladder cause blood to exude from the excoriated or ulcerated surface.

Retention of urine is a not infrequent complication of hypertrophy of the prostate, and depends upon two conditions, viz.: increased congestion of the bladder and prostatic urethra, and spasm of the compressor urethræ muscle. It is apt to come on suddenly and without warning, and may cause much vesical distention. The exciting causes are: catching cold; errors in diet; intestinal distention; alcoholic excess; ingestion of too much fluid; constipation; over-exertion and physical exhaustion; sexual excesses; and operations upon the anus, rectum, and external genitals. Retention of urine in prostatic cases

may be caused by the lodgement of a stone or tumor near the vesical orifice, in which it becomes engaged or impacted, having been carried by the urinary stream.

In many cases, when retention of urine is not promptly relieved, the compressor urethræ muscle becomes weak and loses its tonicity and contractile power. Then the urine begins to dribble, but the residuum yet remains. This condition has been termed incontinence, but it is really urinary overflow.

Prostatic hypertrophy may be aggravated by the congestion which sometimes occurs as the result of troublesome hemorrhoids.

In some cases, during the course of prostatic hypertrophy, there is more or less severe sexual erethism, which usually occurs when the patient's general condition becomes much lowered.

Hernia or prolapse of the rectum is sometimes produced by the violent straining in urination.

Such testicular complications as congestion or suppurative inflammation of the epididymes, testes, and tunica vaginalis not infrequently occur. A mucoid and purulent discharge from the urethra is a not uncommon symptom.

What is known as catheter fever is sometimes observed in the course of hypertrophy of the prostate. This condition may be caused by instrumentation which damages the prostatic urethra or bladder. Within a short time after the traumatism the patient becomes chilly and suffers from malaise. The temperature at first may be subnormal, but it soon rises. The fever is of rather a mild type, either continuous or intermittent, and is usually of short duration.

With the increasing impediment to urination, the severity of the local lesions in the prostate and bladder, and the advancing disorganization of the kidneys, the health of the patient gradually declines, albuminuria and polyuria being constant concomitants. The desire to urinate becomes more severe and imperative and the interval very short. The patient suffers from constant tenesmus, and is only able to discharge a few drops of scalding urine which causes acute pain. He suffers from mental anxiety, headache, sleeplessness, weakness, dyspepsia, and progressing emaciation. His cystitis causes urinary poisoning, and his kidney lesions prevent elimination of the urea, and uræmia is developed. He suffers from a peculiar dry tongue, and his breath has a urinous odor.

In this condition severe chills and fever very often intervene and add to the patient's misery. Death usually results from exhaustion, septicæmia, and uræmia.

The Diagnosis of Hypertrophy of the Prostate.—The diagnosis of prostatic hypertrophy is readily made from a careful consideration

of the patient's symptoms, together with a urinary, urethral, bladder, and prostatic examination, the latter being conducted both by way of the rectum and the bladder.

The previous history of the case being noted carefully in every detail, both sexual and urinary, the patient is asked to stand and void his urine. This being done, the surgeon passes a small, soft-rubber catheter and draws what remains in the bladder (the residuum), noting the depth at which the urine is drawn, which gives the urethral length. The catheter also imparts to the fingers the condition of the deep urethra. The amount of the residual urine being measured, it is mixed with that spontaneously voided, and the specimen examined for urethral and bladder conditions and kidney complications. In order to get a correct idea as to the real amount of the residual urine, the surgeon should always wait until the patient has a normal desire to urinate and never force him to hurry the act. The character and force of the stream should be carefully observed, both on catheterization and urination, which gives us some idea as to the bladder musculature. The residuum being drawn, it must be replaced immediately with an equal amount of warm boric-acid solution, some of which should flush out the urethra as the catheter is withdrawn.

The patient being on his back, or standing upright with body flexed and hands resting on a chair, the prostate is examined by rectal touch which imparts to the finger the size and consistence of the gland, its degree of sensitiveness, and also the condition of the base of the bladder and the rectal mucous membrane. The finger first impinges against the blunt and rounded apex of the gland, then sweeps from the side over its rounded borders, and finally endeavors to hook over its more or less thickened base. In a general way, the enlarged prostate feels somewhat like a triangular mass, with rounded angles and borders, whose blunted apex joins the membranous urethra, its base being directed upward.

The amount and character of prostatic overgrowth into the deep urethra and bladder can only be ascertained by instrumental examination of these parts, and must always be conducted in the most gentle and conservative manner, as traumatism of the now congested deep urethra is apt to be followed by serious and even fatal results. The examination can be conducted under cocaine or eucaine anesthesia, with soft bougies à boule, olivary bougies, coudé catheters, and stone-searchers, which impart to the examiner the amount of deviation either to the right or left, and the loss of calibre of the prostatic urethra. A bar or prostatic projection at the vesical neck is recognized by the degree of depression of its handle necessary to carry a curved instrument over it, which when in the bladder can be inverted and its tip made to sweep

through the post-trigonal pouch, where stones are not infrequently found. At the same time the condition of the bladder-walls can be ascertained by passing the instrument gently over them, which will show whether they are smooth, rugous, or trabeculated.

It may sometimes be considered wise and even necessary to examine the overgrowth and bladder with the cystoscope; but this should not be carried out as a routine method, but reserved for certain rare and exceptional cases, in which tumor or stone is suspected and cannot be found by other methods.

The presence of urethral stricture, which sometimes complicates and aggravates prostatic hypertrophy, is best ascertained by soft bougies à boule.

On account of the age of the patient, the congested condition of the parts, the susceptibility to infection, and the possible kidney complications, the surgeon must always be as gentle and cleanly in his examination as possible, which should never be too long or exhaustive at the first consultation.

The Treatment of Hypertrophy of the Prostate.—PALLIATIVE TREATMENT.—These patients must live moderate and regular lives, being careful not to expose themselves to cold and wet, or to do anything that will congest and irritate the urinary and sexual tract. Their sexual relations must be moderate and regular, always avoiding ungratified sexual excitement. They should always urinate when the desire comes on and never try to hold the urine after this time. They can drink freely of any bland water, but must be moderate in the use of alcohol, taking a little whiskey with meals, if indicated, but avoiding all other alcoholic beverages; coffee should be taken weak and but once a day. Any article of diet that causes urinary irritation must be strictly prohibited. The bowels are to be regulated and hemorrhoids treated in an appropriate manner according to their severity. As these patients urinate more freely when they are up and about, they should exercise intelligently in the open air and sunshine, and keep the secretory apparatus of the skin in working order by means of baths, rubbings, and massage. Internal medication depends entirely upon the reaction of the urine, which should be kept as normally acid as possible, and for this purpose there is no better preparation than urotropin, given in seven-grain doses three times a day. Cystogen is likewise said to act in a very satisfactory manner, as is also boric acid alone or combined with salol or tincture of hyoscyamus. Dilute nitric and nitro-muriatic acid may be given in suitable doses. If, on the other hand, the urine seems too acid, we may employ bicarbonate of soda, or the acetate, citrate, or bicarbonate of potash.

The hot sitz-bath, or hot rectal irrigations of normal salt solution,

act in a very beneficial manner in reducing the prostatic congestion and its concomitant symptoms, and should always be tried in these cases. Suppositories of ichthyol sometimes act in a similar manner. For pain and tenesmus we may sometimes have to resort to the guarded and intelligent use of small doses of codeine, opium, morphine, and belladonna, either by the mouth or rectum. Strychnine, quinine, and tonics in general are indicated in run-down and debilitated subjects.

Gentle prostatic massage may be employed in certain cases with benefit, but should never be practised in a routine manner or if pyuria is marked and the prostate acutely congested, these conditions being greatly benefited by rectal irrigations of hot water.

Catheter life, by which is understood the regular evacuation of the bladder, is instituted with the view of relieving that viscus of its residuum which by its presence increases the post-prostatic pouch, thus rendering urination more frequent and difficult and cystitis with possible stone formation more certain. The time to begin the use of the catheter rests largely upon the surgeon's common sense and good judgment, and no definite and infallible rules can therefore be made. When, however, the frequency is marked and the patient has several ounces of residuum, it is best to begin gentle catheterization with soft and sterile instruments, providing we cannot relieve his condition by means of the previously described methods of treatment. We should always select the smallest and softest catheter that will enter, be sure that it is clean, and pass it with the utmost care and gentleness, say once in twenty-four hours, or oftener if indicated by a larger residuum. The urine being drawn, the surgeon can then irrigate the bladder and prostatic urethra with a few ounces of warm boric acid, salt, zinc, alum, or permanganate of potassium solution, leaving a little in. Later can be used boroglyceride (ʒj to ʒij to water ℥xvj), iodine trichloride 1 to 3000, salicylic acid (gr. $\frac{1}{8}$ to ℥j), and, best of all, nitrate of silver either in instillations or irrigations. When the urine is clear and transparent, and contains flakes (tissue elements), only then instillations of nitrate of silver beginning with 1 to 4000 are to be used; if, on the other hand, the urine is cloudy from pus and mucus, then irrigations of nitrate of silver, beginning with 1 to 16,000, are required, as more surface has to be acted on. By these means we endeavor to check the urethro-cystitis, to restore the mucous membrane of the bladder and deep urethra to a fairly normal condition, and to reduce the size and sensitiveness of the enlarged prostate gland, all of which are possible in many cases if the surgeon is skilful and patient and avoids all traumatism of the deep urethra and bladder.

If frequency is very marked, causing the patient to be up many times during the night, a catheter can be tied in at bedtime, which will

keep the bladder drained and in some cases enable the patient to get a good night's rest; in others, however, it cannot be retained on account of the irritation it produces.

Suprapubic drainage will give immediate but only temporary relief in prostatics suffering from long retention of urine with subsequent pain, congestion, and tenesmus, so it should only be resorted to as a palliative measure or until something of a radical nature can be undertaken. There is always more or less leakage of urine around the tube, which keeps the patient in a most uncomfortable and offensive condition. Perineal drainage is not to be advised. Forcible dilatation of the prostatic urethra, either with sounds or specially constructed instruments, is merely mentioned to be condemned, on account of the traumatism to the mucous membrane of the deep urethra and the almost certain development of urinary infection.

OPERATIVE TREATMENT.—So long as catheterization is easy and painless, the residuum small and clear, the obstruction to urination moderate, and the bladder musculature acts in a satisfactory manner, the surgeon should advise against operation, since, with appropriate internal medication and local applications given by means of soft-rubber instruments, we can so improve the congested condition of the parts that these patients may live for years in comfort; so that as a result of this treatment the number of cases demanding operation will be materially reduced, if seen at an early date. When, however, palliative treatment fails to give relief and to prevent the further progress of the disease—viz.: increase of obstruction, with frequent, painful, and difficult catheterization, uncontrollable cystitis, and increasing residuum—it is time to consider some form of operative interference best suited to the requirements of each individual case.

The selection of an appropriate operation is all-important, and can only be decided on by the surgeon, who must be guided entirely by the results of his examination and his personal experience and judgment in such cases, since no particular operation is applicable to all cases of hypertrophy demanding operative intervention.

The following are the operations now performed for the relief of prostatic hypertrophy and obstruction:

Prostatotomy consists of the division of the obstruction at the vesical orifice, either with cutting instruments [illegible] or with specially constructed galvano-caustic instruments [illegible] the overgrowth being attacked through the perineum or by way of the urethra.

Perineal Prostatotomy.—The patient is placed in the lithotomy position and a grooved sound is passed, the [illegible] being carried on its convexity as the apex of the prostate [illegible] felt by the index-finger. The obstruction at the vesical orifice is opened with a

blunt bistoury, and a large, soft-rubber perineal tube inserted for drainage. This operation is to be strongly condemned, as the surgeon cannot see what he is doing; the perineal wound is small and difficult to operate upon, and hemorrhage is apt to be free and not easily controlled.

Urethral prostatotomy has been performed by a limited number of operators with special cutting instruments (prostatomes), but it has never been endorsed and practised by surgeons in general, and is at best an antiquated and hazardous procedure, no longer to be employed.

Bottini's galvano-caustic operation is, strictly speaking, urethral prostatotomy, the operator burning one or more grooves through the obstruction by means of Freudenberg's modification of Bottini's incisor. (See Fig. 81.)

Before performing Bottini's operation, the surgeon should make a cystoscopic examination of the bladder to ascertain the condition of its walls, the conformation of the prostatic enlargement, and perhaps the presence of an overlooked stone. The prostate should also be examined by rectal touch. The patient is placed on his back and the bladder and urethra irrigated with salt solution, several ounces of which should be retained (air has also been employed for vesical distention). The urethra is anæsthetized with eucaine solution, thus rendering the operation practically painless. The battery and incisor are now tested to ascertain the current needed to bring the platinum blade to a white heat. The cooling apparatus is also tested. The incisor, being in working order, is passed into the bladder in the usual manner; the beak of the instrument is now turned down into the post-prostatic pouch and pulled forward so that its concave surface presses against the obstruction. The cooling apparatus is started, the current turned on, and, after a few seconds, in order to be certain that the blade is white-hot, the wheel at the handle is turned very slowly, the operator noting on the scale the length of the cut. When this is satisfactory, the blade is returned to the groove in the female shank. The current is then turned off. If it is deemed necessary to burn through one or both of the lateral lobes, the beak of the incisor is turned upward and the burning is accomplished as already described. The operation being completed, the current is turned off, the blade allowed to cool, and the instrument withdrawn. The patient is put to bed and allowed to

Fig. 81.

Freudenberg's modification of Bottini's incisor.

urinate if he can, otherwise he must be catheterized when necessary and the bladder irrigated if it is deemed advisable. Apparently simple as the above operation is, it must be remembered that it is done in the dark, and that it may be followed by hemorrhage, epididymitis, abscess of the prostate, sepsis, pyæmia, and even embolism of the pulmonary artery; in other words, the bladder does not have the free drainage which is so essential in this class of cases, the obstruction not being removed at the time of operation. It may prove of value in a limited number of carefully selected cases, but must not be undertaken lightly when cystitis is marked and the kidneys in a damaged condition. It is too early as yet to speak definitely as to the permanency of the results and the exact class of cases to which it is best suited.

Prostatectomy consists of the partial or complete removal of the gland, either through a perineal incision or by the usual suprapubic operation.

Perineal prostatectomy as modified by Alexander is performed as follows: The patient being on his back, a small suprapubic cystotomy is performed, the wound being made just large enough to admit two fingers; the patient is then placed in the lithotomy position and a tunneled sound passed, on the convexity of which the membranous urethra is opened in the usual manner. The sound is then removed and the prostate pressed down into the perineal wound by two fingers in the bladder, the capsule of the prostate is opened at its apex, and the gland shelled out by the fingers and blunt forceps; first the lateral portions, and finally the posterior median lobe. The removal of the gland can sometimes be expedited by seizing the prostate with forceps and holding it well down in the wound. Hemorrhage is usually quite severe. The bladder is drained both by the suprapubic and perineal wounds. Alexander sometimes performs this operation without the aid of the suprapubic cystotomy incision.

Suprapubic prostatectomy is the operation to be chosen in the great majority of cases demanding operative relief, as the overgrowth can be inspected, hemorrhage readily controlled, and calculi removed without adding any risk to the operation. Suprapubic cystotomy having been performed in the usual manner (see page 376), the wound is stitched to the parietal incision. The patient can now be placed in the Trendelenburg position, or left on his back. The edges of the wound being well retracted, the prostate is inspected by aid of an electric light, and carefully palpated, after which the projecting portions and as much of the gland are removed as is necessary to restore the normal calibre and level of the floor of the prostatic urethra. The portions of the gland are enucleated with the finger or forceps through one or more incisions made through the bladder mucous membrane. The hemorrhage is usu-

ally so free that the surgeon can see nothing and has to rely on touch alone. This part of the operation must be done most carefully, always bearing in mind to do as little tearing and cutting as possible. The hemorrhage, when quite severe, can be controlled by very hot irrigations of saline solution thrown into the suprapubic wound, combined with packing the bladder, or, better still, the application of a Keyes pad, passed through the wound into the bladder and held firmly against its bleeding base by a heavy silk cord which is tied to its centre and passed out of a small perineal wound or the urethra and held taut externally by clamping it tightly against a piece of gauze. At the end of twenty-four hours the pad may be carefully removed. The bladder can be drained by a suprapubic tube alone, or, better still, by a combined suprapubic and perineal drainage.

Orchidectomy, or castration (see page 360), for the relief of prostatic hypertrophy, although enthusiastically brought into prominence of late, has not been generally endorsed by the profession at large as a sound surgical procedure. It is followed in some cases by a diminution of the congestion and swelling of the glandular elements of the prostate, but it is still an open question as to whether there is a true and permanent atrophy or shrinking of the entire gland substance. The mortality is about as high as after prostatectomy, and if stone is present, or if portions of the prostate are ulcerated and covered with calcareous deposits, the patient has to be subjected to a second operation for its relief; the obstruction to urination is not removed immediately, and therefore the inflamed and overworked bladder, sometimes containing an undetected stone, cannot receive the immediate benefit of free drainage which is so essential in these cases. The operation, if employed at all, should only be done in those cases of soft boggy prostate and never in fibrous and myomatous ones, as these latter can only be benefited by a thorough prostatectomy. The sexual mutilation, with its immediate and remote deleterious and even fatal effects on the patient's nervous system, must be taken into serious consideration.

Vasectomy has been suggested and practised as a substitute for castration. It is at best an experimental procedure, with possibly some therapeutic value in certain chronic congested conditions of the prostate, but not in true hypertrophy. The operation is done under cocaine anæsthesia, the cord-like vas being pinched up beneath the scrotal tissues, which are divided and the vas hooked out through the little wound; two ligatures are applied about an inch apart and the included portion excised.

Ligation of the internal iliac arteries for prostatic hypertrophy has been performed, and is merely mentioned here to be most emphatically condemned.

The Treatment of Retention from Hypertrophy of the Prostate.—In many old men the bulb of the urethra becomes redundant and pouchy, and its relaxed membrane is very much thrown into folds. As a result of this flabby condition, when the tip of the catheter reaches the sinus of the bulb, it is found that the tonicity of the tissues is so lost that there is nothing left of a firm character to guide its further progress. As a result, the end may impinge on the sagging lower part of the bulb, and there be held as in a true cul-de-sac. In general, the end of the instrument catches in the lower, pouch-like part of the bulb, and it is here that false passages are usually made, in which case the instrument either pierces the triangular ligament or glides under it and makes a pathological channel in the soft tissues beneath the membranous urethra and the prostate.

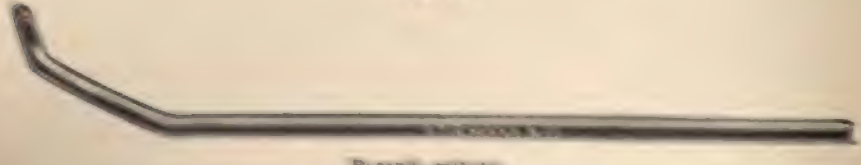
This abnormal anatomical condition of the bulbous urethra has to be met with appropriate instruments. What is needed under these conditions is an instrument of sufficient firmness of structure to make its way through the canal, whose end points slightly upward, and which at its curve shall have such a shoulder that if it sinks down to the lower wall of the pouchy bulb its tip will then point upward and strike the orifice of the bulbo-membranous junction. The instruments which best fulfil these requirements are the Mercier coudé and bi-coudé catheters. (See Figs. 82 and 83.) Whether these instruments are used by the surgeon or by the patient, it is always very necessary that there shall be some reliable guide which shall point to the side of the instrument which corresponds to its convexity.

Many of the coudé catheters on sale are faulty by reason of the shortness of their curved portion, which should be fully one inch long, and in accordance with the curve depicted in Figs. 82 and 83. They

Fig. 82.

Coudé catheter.

Fig. 83.



Bi-coudé catheter.

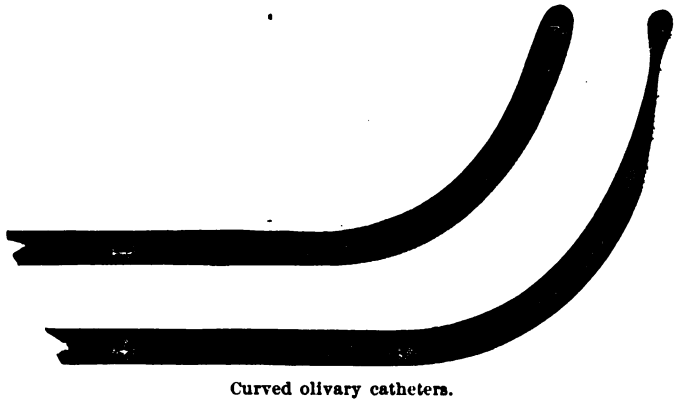
should be well lubricated and slowly passed down the canal, and as they traverse the bulbous urethra it is well to gently guide their course by

steadying the parts just back of the scrotum. By this manœuvre the point is made to enter the bladder.

In enlargement of the prostate, in the main, three abnormal conditions are encountered in catheterization. In the first place, the urethral canal may be much elongated by the progressive growth of the gland toward and in the bladder, the so-called perineal distance. In the second place, by its concentric growth, this organ so contracts the urethral lumen or distorts its normal straightness of direction and renders it sinnous, that much impediment to urination is produced. In the third place, the bar or the valve-like mass at the vesical orifice may act as a very serious obstacle to the entrance of instruments into the bladder. Now, these pathological conditions also have to be overcome by means of appropriate catheters.

In the majority of cases of elongation of the urethra, with a corresponding greater curve of the canal, the bladder can readily be reached by means of the extra-curved olivary catheters (see Fig. 84), called

FIG. 84.



Curved olivary catheters.

prostatic catheters. These instruments, when used in sizes of 20 to 24 French, are much more serviceable, as a rule, than the smaller and larger ones are. They are much to be preferred to the old-time silver prostatic catheter, which by its density and inflexibility often caused pain, uneasiness, and inflammation. The long curve of these prostatic catheters is often of material aid in traversing a pouchy, bulbous urethra.

In some cases, soft India-rubber catheters or straight, blunt-pointed, lisle-thread catheters will readily traverse the urethral canal.

It may be necessary, when the calibre of the prostatic urethra is much reduced or its straightness much distorted, to use these catheters with the long curve or the straight ones in sizes smaller than 20 French.

When the catheters already spoken of cannot be obtained, the old-style brick-red English catheter may be used if at hand. It is well, if it is a straight instrument, to soak it in hot water, then give it the necessary curve, which may be rendered sufficiently permanent by immediate immersion in iced water.

In cases of valvular obstruction or of a bar at the vesical orifice, much difficulty may be met in reaching the bladder cavity. Sometimes the tip of the Mercier catheter, coudé and bi-coudé, particularly when smaller than 20 French, will glide over the obstruction in a surprisingly prompt manner. Then again it may strike against it, and no manœuvre will cause it to traverse it.

In many cases the gum-elastic prostatic catheter will, by the forward tilting or bending of its tips or forward pressure, glide past the obstruction upward into the bladder. In these obstinate cases it may be necessary to use the prostatic guide, which will steady and direct a soft-rubber catheter. Or the ordinary wire which is found in English catheters, or a piece of ordinary wire ten or twelve inches long, may be curved in accordance with the long prostatic urethra. This wire is introduced into a soft-rubber catheter, and then the combined instrument is passed until it reaches the bladder or comes to a standstill on meeting the obstruction. Then it is well to withdraw the wire for about half an inch, and again push forward, when the flexible end may clear the obstruction. If this procedure fails, the surgeon should still further pull out the wire another half inch and then try to pass the obstruction. In case of final failure, the condition of the case will determine in the mind of the surgeon whether it is necessary to resort to aspiration, suprapubic puncture, or to perform suprapubic cystotomy.

It is very important not to completely empty the bladder in elderly or old men who are suffering from retention of urine due to prostatic hypertrophy and also to stricture of the urethra. (See section on Retention of Urine Due to Stricture, pp. 219 and 220.)

TUBERCULOSIS.

The prostate is involved in the majority of cases of tuberculosis of the genito-urinary tract. Its development may be primary or secondary to infecting foci in adjacent or remote parts. It is mostly observed at puberty and in early life.

Tuberculosis of the prostate may cause azoöspermatism by the obliteration of the ejaculatory ducts.

The course of tuberculosis of the prostate may be acute, subacute, or chronic.

In the majority of cases the disease begins in the urethra, but it

is also found in the substance of the gland and on its periphery, particularly near the rectum.

In cases of urethral involvement the symptoms are complained of quite early. The most prominent symptom is pain, particularly on urination, which may be very urgent, and it may be either continuous or intermittent. Invasion of the prostate is usually followed quite promptly by extension to the bladder, with its customary group of symptoms.

In cases of prostatic tuberculosis there is usually a more or less profuse mucopurulent discharge, which may escape spontaneously or on defecation. When the tuberculous nodules are seated in the parenchyma of the prostate, they may not give rise to pronounced symptoms for some time. This is particularly the case when the course is very chronic. When the tuberculous nodules are seated toward the periphery of the organ, they may occasion few, if any, symptoms; but when they are very superficially seated, particularly near the rectum, they may cause pain and uneasiness in those parts.

On rectal examination the finger-tip may not encounter any abnormality when the urethral part of the prostate is attacked. When the nodules are seated in the parenchyma of the organ and they have become quite large, or when several have coalesced and project on the surface, their presence may be determined by palpation with the finger in the rectum.

The diagnosis of prostatic tuberculosis may be made by examination of the morbid secretion or of the urine. But in many cases such examinations fail to reveal the bacillus tuberculosis until digital pressure has been brought to bear on the gland and on the urethral canal.

Treatment.—Tuberculosis involving the urethral canal may be benefited by prostatic and bladder irrigations of warm solutions of bichloride of mercury (1 : 1000 or 1 : 6000). In the event of this treatment causing pain and urethral irritation, it will be necessary to discontinue it. In some cases iodoform and sweet-oil (10 per cent.), in the form of injections, have seemed of benefit in cases of ulceration of the urethra.

Tubercular abscess of the prostate may be reached by a crescentic incision made an inch in front of the anus and carried down between the gland and the rectum; they are then incised and packed with iodoform gauze.

Change of climate (see section on Tuberculosis of the Testis, p. 353) is the main indication in these cases, which are usually those of more or less extensive distribution of the tubercular process.

PROSTATIC CALCULI.

Prostatic stones originate either in the follicles of the prostate and increase gradually in size and number, or, having their origin in the bladder, leave it, and, passing into the prostatic urethra, become more or less encysted there, and by slow degrees sink into the gland tissue. Their surfaces are usually faceted and highly polished from the constant friction with each other. They are made up principally of the phosphate of lime.

Symptoms.—In some cases the symptoms are very mild and point to slight posterior urethritis, and in others they are entirely wanting. If, however, the calculi are the cause of prostatic suppuration, we then have the typical symptoms pointing to this condition.

Treatment.—As a rule, these stones should be removed through a perineal incision, although there are some cases in which it is possible to extricate them with urethral forceps.

MALIGNANT GROWTHS.

Primary carcinoma and sarcoma of the prostate are extremely rare, but do occur, usually at and after middle life, carcinoma being the more common of the two.

The symptoms at first are practically the same as those of hypertrophy, with which malignant growths are sometimes associated. Very soon, however, the pain becomes constant and intense, radiating into the perineum, abdomen, penis, and thighs. Urination is increased in frequency both by day and by night, until in a short time the patient is in a state of constant and agonizing tenesmus. As the growth increases in size, the vesical orifice becomes more and more occluded and distorted, until finally complete retention is added to the patient's deplorable condition. Cystitis, which was mild at first, soon becomes more marked on account of the decomposition of the urine, which now becomes alkaline in reaction. Hemorrhages are often profuse and frequent and liable to occur at any time independent of urination. The patient is greatly reduced thereby, and finally dies from pain, exhaustion, and kidney complications, the result of ascending infection and urinary obstruction.

Treatment.—If the malignant nature of the trouble is recognized at an early enough date (which is rarely done), some benefit may result from a removal of the growth through a suprapubic incision; later on, however, all that can be done is to establish suprapubic drainage and bladder irrigation, in conjunction with the intelligent use of morphine and the regulation of the patient's general condition.

TRAUMATISMS.

Wounds of the prostate, either incised, lacerated, or contused, are exceedingly rare, on account of the protected condition of the gland. They may occur, however, in the course of surgical operations involving the deep perineal region, and also as the result of forcible and unskilful instrumentation of the prostatic urethra, and as a complication of crushing injuries of the pelvis.

Treatment.—Simple incised wounds require the ordinary surgical treatment for this class of cases. If, however, the gland and deep urethra are extensively lacerated, the bladder should be drained immediately by the perineal route to prevent urinary extravasation, hemorrhage should be controlled, and the parts kept scrupulously clean, as infection in this region is apt to be very serious on account of the rich plexus of prostatic veins, which favor the absorption of poisonous material, and which may result in septicæmia and death.

CHAPTER XV.

AFFECTIONS OF THE TESTIS AND ITS APPENDAGES AND ENVELOPES.[1]

HYDROCELE.

By the term hydrocele we understand a chronic serous effusion into the cavity of the tunica vaginalis testis, which produces more or less distention of the scrotal sac. Hydrocele, therefore, must not be confounded with the acute and ephemeral dropsy of the vaginal tunic which occurs in acute epididymitis, and which is called acute vaginalitis. Hydrocele may also occur in cysts of the testis and epididymis and in the cord.

For clearness of description we may divide the various forms of hydrocele as follows: 1, hydrocele of the tunica vaginalis testis; 2, hydrocele of the cord; either of which may be congenital or acquired.

Congenital Hydrocele of the Tunica Vaginalis Testis.—Congenital hydrocele is mostly seen in young subjects, and consists anatomically in the communication of the tunica vaginalis testis with the peritoneal cavity by means of a minute duct or opening. After the descent of the testis from the abdominal cavity into the scrotum there has been failure in the obliteration of the channel of communication between the testicular serous membrane and that of the peritoneal cavity. When this communication exists there may be found an effusion in the cavity of the tunica vaginalis which produces a scrotal tumor when the patient stands erect, but in the horizontal position the tumor is effaced, owing to the fluid gravitating back into the peritoneal cavity. As the fluid thus flows backward it is not accompanied by a gurgling noise, such as is produced by the return of descended intestine.

Diagnosis.—The tumor in congenital hydrocele is smooth, transparent, fluctuating, translucent, and extends from the bottom of the scrotum into the inguinal canal. The light test and the hypodermic syringe will give much aid in establishing the diagnosis. Even in the upright position the contents of the tumor may be by pressure forced into the peritoneal cavity, while the testicle remains in the scrotum. Then with the tip of the finger over the inguinal canal, if the pressure is slightly removed the fluid will gravitate, slowly and without sensation to the finger, back into the scrotum. An intestine in thus passing down

[1] For epididymitis and epididymo-orchitis see pp. 113 *et seq.*

produces decided distention, and its progress can be distinctly felt. In the horizontal position the contents of congenital hydrocele pass slowly on by pressure into the abdominal cavity without any marked sensation. On the other hand, the reduction of a hernia is attended with a decided jump or impetus. The hydrocele tumor is dull on percussion, while that of hernia is resonant.

Treatment.—In most cases of congenital hydrocele a firmly applied truss over the inguinal canal will produce obliteration of the vaginal process, after which the fluid in the tunica vaginalis will be absorbed in a short time. In case of failure of this procedure the sac may be aspirated antiseptically and firm pressure may again be applied.

In the event of a complicating hernia a radical operation may be performed for the cure of both conditions.

Acquired Hydrocele of the Tunica Vaginalis Testis.—This form of hydrocele is most commonly seen in adults and in persons of middle life and rather exceptionally in adolescents. It therefore occurs in the years when the sexual powers are at their best and the testicular circulation is most active, and when individuals are most commonly attacked by gonorrhœa and syphilis and liable to traumatisms of the genitals. Simple hydrocele is, as a rule, unilateral and exceptionally bilateral. As usually found, the scrotal tumor formed by the hydrocele is pear-shaped, with its base at the bottom of the scrotum and its apex directed toward the external abdominal ring. In a goodly number of cases the shape of the tumor is distinctly ovoid, with its long axis directed vertically or perhaps a little forward. Less commonly the tumor is rather roundish in shape. The size of the tumor varies with the amount of effusion, which may be several ounces or even pints. As a rule, from eight to sixteen ounces of fluid can ordinarily be drawn from cases of hydrocele.

To the eye the scrotal tumor presents a quite characteristic picture. The scrotal wall is very much distended, tense, and usually much thinned, and the scrotal veins are very distinct and enlarged. By palpation a very firm (see Fig. 85), resistant, elastic tumor is felt, which may give a sensation of slight fluctuation. Pressure does not in any way render the tumor smaller, though the finger-tip can cause a depression for a moment.

In some subjects, particularly fat and flabby ones, the penis is drawn backward, and its tegumentary covering is largely included in the scrotal tumor, which hangs quite saliently between the thighs.

This form of hydrocele may be complicated by the coexistence of hernia. When the latter is as yet non-adherent to the hydrocele the diagnosis is readily made by the impulse on coughing and the resonance of the upper tumor. When the hernia has become adherent to the

upper end of the hydrocele much care is necessary in making a diagnosis. In cases of strangulation of the hernial sac the difficulty in making the diagnosis is more marked.

Simple hydrocele is, as a rule, not the seat of pain, and it can be manipulated with impunity except on its posterior and upper surface or that part in which the testis is situated. Pressure usually causes more

Fig. 85.

Hydrocele.

or less discomfort, and it is here that patients state that pain exists, either from the pressure of a suspensory or from over-exertion.

The onset of hydrocele is usually very slow and without any symptoms. Its further course is also slow and insidious, so that, as a rule, the tumor has reached the size of a small pear before its presence is recognized by the patient.

The fluid of hydrocele usually has a straw color and is highly albuminous. It has been found of a dark-brown and even black color from admixture with blood. It sometimes contains a small quantity of cholesterin, and in some few instances spermatozoa have been found in it. In some cases little flakes of albumin are seen floating in the fluid.

Quite exceptionally the fluid of hydrocele looks like milk, from its admixture with lymph. This form, termed chylous hydrocele, is observed in southern countries, and is caused by the filaria sanguinis hominis which reaches the cavity of the tunica vaginalis by way of the lymphatics.

Several accidents and complications may occur in the course of hydrocele. As a result of blows or other traumatisms blood may be effused into the vaginal cavity, in which event the hydrocele is transformed into hæmatocele.

Inflammation may attack the walls of the vaginal sac, which is the seat of hydrocele. In all probability this is the result of traumatism. Purulent inflammation of the tunica vaginalis may follow tapping, and there can be no doubt that the trocar in these cases carries the pyogenic microbe into the cavity. In this inflammatory process the walls of the tunica vaginalis may become very much thickened, even to the extent of an inch or more.

Anomalous Forms of Hydrocele.—Rather infrequently we find a scrotal tumor, due to hydrocele, which presents an uneven surface and is more compressible in some parts than others. This condition is due to exudative or adhesive inflammation of the tunica vaginalis, which produces bands of fibrous tissue which divide the cavity up into several compartments. Thus is produced an encysted hydrocele, which may not appear translucent when the light test is applied.

In still rarer instances we find that owing to exudative inflammation more or less of the wall of the tunica vaginalis is thickened, sometimes in a considerable degree. Upon palpation we find an uneven surface, and a marked difference is experienced between the thickened plaque and the balance of the unaltered tunica vaginalis. Then, again, in some cases of great thickening of the walls there are areas of the diameter of half an inch or an inch, in which there is no thickening at all, and on inspection such a membrane presents an appearance similar to windows in a wall.

Circumscribed hydrocele is also somewhat rarely found. In these cases a large portion of the two layers of the tunica vaginalis has become adherent, and a dropsy has occurred in a limited portion, which produces a swelling, usually round or oval, which is attached to the testis.

Under the title "hydrocele bilocularis," a peculiar and rare form of the affection is described. (See Fig. 86.) In this form the hydrocele tumor is in the scrotum, extends up the inguinal region and through the rings by a narrow neck, and is continuous with another tumor seated within the abdominal cavity and underneath the parietal peritoneum, and entirely independent of it. In this form of hydrocele the vaginal process of the peritoneum has become obliterated within the abdominal

cavity, and has probably not undergone obliteration toward the testicle. When the patient stands erect the scrotal tumor is large and tense, and

Fig. 86.

Hydrocele bilocularis.

when in the horizontal position it is more or less flaccid, owing to the gravitation of the fluid into the abdominal cavity. The dimensions of this form of hydrocele are sometimes very great. In one case the tumor filled part of the abdominal cavity and extended up to the umbilicus and beyond the median line.

Another rare and anomalous form is called "diverticular hydrocele." In this form there are two cavities, the one around the testis, and the other outside of that and communicating with it by means of a small opening or neck. This hydrocele begins as the ordinary form, but, owing to some cause, perhaps localized thinning of the sac-wall, a slight bulging occurs, and soon a diverticulum is formed. This second cavity goes on increasing until it becomes larger than the original sac. The orifice of communication in these cases is about large enough to admit the tip of the forefinger, and by its firm structure it remains permanent. The translucency is marked in this form of hydrocele, owing to the extreme thinness of the walls of the diverticulum.

Diagnosis.—The diagnosis of hydrocele is usually quite easy. Its slow development without symptoms, its beginning at the bottom of the scrotum, its pyriform or oval shape, are presumptive symptoms, of much importance. The crucial test of hydrocele, however, is its trans-

lucency, and this may be determined by what is known as the "light test." The simplest application of this test is as follows: In strong sunlight the patient is made to stand before the surgeon, who sits at his side: he then shades the convexity of the tumor with the outer side of his hand, and examines the organ. In cases where the scrotal wall and the tunica vaginalis are thin and their fluid transparent, translucency can readily be made out. In the absence of sunlight a candle, a gas-light, or the electric light may be used. The light is placed on the opposite side of the scrotum, and the surgeon examines the part either by means of a cylinder of paper or by shading his eye with the hand. Distinct translucency is seen in the anterior portion of the tumor, while posteriorly the opaque body of the testis may be detected. This body, when thus inspected, usually looks rather smaller than one expects to find it. In somewhat rare cases we find the testis situated anteriorly and at the upper part of the tumor, the tunica vaginalis being placed posteriorly. Quite exceptionally the testis is at the bottom of the tumor.

In many cases it is utterly impossible to clearly define the outlines of the testis by palpation. Its position, however, may then be ascertained by pressure, which, when made on the organ, causes pain or discomfort. When the testis can be made out, it is often impossible to define the outlines of the epididymis, the reason being that with the distention of the tunica vaginalis the parts are so spread out that the epididymis lies flat on the tumor and presents very little if any salience. After the withdrawal of the fluid the testis and epididymis regain their normal relations.

In old hydrocele such is the thickness of the sac that the translucency is quite dim. In very dense, thick sacs there is no translucency whatever.

The points in diagnosis between hydrocele and hernia are as follows: In hydrocele the tumor presents dulness on percussion; there is no impetus on coughing and no change in the tumor when the patient is in the horizontal position. In hernia, particularly incarcerated, the tumor comes usually suddenly from above, where it is largest, and is doughy, and, as a rule, resonant, on percussion.

Two forms of testicular diseases may be mistaken for hydrocele, namely, syphilitic orchitis and cystic sarcoma.

In syphilitic orchitis the enlargement occurs slowly in the whole extent of the testis and epididymis and not at the bottom of the scrotum. As the tumor forms it becomes hard and heavy and may be accompanied by slight hydrocele of the tunica vaginalis. In syphilitic orchitis there is usually a history of infection or of some other specific lesion or lesions. In this form of tumor there is never translucency.

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heavier; the testicle with its epididymis is to be felt perfectly distinct below this fulness, neither enlarged nor in any manner altered from its natural state; the spermatic cord is considerably larger than it ought to be, and feels like a varix or like an omental hernia, according to the different sizes of the tumor; it has a pyramidal kind of form, broader

FIG. 87.

Diffuse hydrocele of the cord.

FIG. 88.

Encysted hydrocele of the cord.

at the bottom than at the top; by gentle and continued pressure it seems gradually to recede or go up, but drops down again immediately upon removing the pressure, and that as freely in a supine as in an erect

posture. It is attended with a very small degree of pain or uneasiness, which uneasiness is not felt where the tumefaction is, but in the loins. If the extravasation be confined to the spermatic cord, the opening in the tendon of the abdominal muscle is not at all dilated, and the process passing through it may be very distinctly felt; but if the connective tissue which invests the spermatic vessels within the abdomen be affected, the tendinous aperture is enlarged, and the increased size of the distended membrane passing through it produces to the touch a sensation not very unlike that of an omental rupture. (See Fig. 87.)

This form of hydrocele may be mistaken for a hernia. The latter often passes into the abdomen when the patient lies down, while the former is but slightly if at all displaced. The swelling of hydrocele is firmer, though doughy, and fluctuating; a hernia, moreover, unless it be omental, is resonant on percussion. The impulse on coughing in hernia is quite different from the very slight downward movement of the enlarged cord in hydrocele. In hernia the cord can always be traced in normal size from the testis to the ring.

The **treatment** consists in making small punctures at the most dependent part of the tumor, and in subsequently maintaining pressure. In very chronic cases large blisters should be employed.

Encysted hydrocele of the cord occurs most commonly in infants. It forms slowly and without pain, and may reach the size of an egg before being seen by the surgeon. It is distinctly circumscribed, round or oval, translucent, firmly attached to the spermatic cord, movable upon firm traction, and not involving the overlying skin. It is firm in consistence and but slightly fluctuating. (See Figs. 87 and 88.)

There is seldom more than one tumor, but we sometimes find a series of tumors extending from the testis to the external abdominal ring. When occurring in infancy the lesion may result from imprisonment of a congenital hydrocele; in adults, however, it originates in the same manner as do the hydroceles of the epididymis. The cyst-wall is usually thin and fibrous, but in chronic cases it becomes very thick and tough. The fluid contents of the cyst are colorless, like water, or viscid and mucoid, and sometimes spermatozoa are found in it.

These cysts may be seated at any part of the cord; those of the epididymis are sometimes wrongly considered cysts of the cord. When the latter are seated near the external abdominal ring the diagnosis may be very difficult, otherwise it is generally easy. The character and situation of the tumor and its mobility with the cord and testis are usually distinctive. The danger of mistaking hernia for encysted hydrocele may be avoided by observing the uniform size of the latter, its circumscribed condition, its translucency, and the absence of impulse on coughing and of the gurgling sensation. (See Fig. 89.)

Treatment.—In children this affection usually disappears spontaneously. The process of absorption may be hastened, if desirable, by counter-irritation with tincture of iodine. Withdrawal of the fluid and subsequent pressure sometimes produce a perfect cure. In very obsti-

Fig. 89.

Encysted hydrocele of the cord.

nate cases injection of the tincture of iodine or carbolic acid may be resorted to. A modified Volkmann's operation may be performed, particularly in cases of multilocular cysts.

Hydrocele of a Hernial Sac.—In some very rare cases of inguinal or scrotal hernia, the sac becomes obliterated and shut off from the peritoneal cavity. This closed sac may contain fluid and a portion of gut or omentum, and the condition is termed hydrocele of a hernial

sac. This tumor may or may not be translucent, and may be the seat of fluctuation. It may be necessary to make an exploratory incision in order to establish the diagnosis.

Treatment.—The sac must be excised and a radical operation for hernia performed.

HÆMATOCELE.

Hæmatocele is an acute or chronic effusion of blood into the cavity of the tunica vaginalis testis, into the testis itself, the epididymis, or the cord, or into all these structures combined.

Hæmatocele of the Tunica Vaginalis Testis.—This affection occurs in an acute and chronic form.

Acute Form.—This form is usually of traumatic origin. The effusion of blood may take place into a vaginal cavity previously the seat of hydrocele or into a perfectly healthy one.

The exciting causes of acute hæmatocele are blows, wounds, violent muscular strain, and punctures. In some cases there is coincident effusion of blood into the scrotal tissues.

Acute or traumatic hæmatocele is usually developed very rapidly; the tumor becomes enlarged, hard, and painful, and the scrotum may be œdematous or the seat of blood-effusion. There are usually more or less constitutional disturbance and pain from the tension of the parts. The effused blood often acts as a foreign body, causing suppurative inflammation. Again, the blood may coagulate, as it does in aneurism, or it may remain fluid. Thus the course of the affection is sometimes severe, and, on the contrary, when the effusion is moderate very little trouble is experienced. If the case runs a chronic course the tunica vaginalis may become much thickened.

The shape of the tumor in vaginal hæmatocele is similar to that of vaginal hydrocele. Translucency is not found in any form of hæmatocele.

The **diagnosis** of acute traumatic hæmatocele is generally clear, the history of the case and the local condition indicating its nature.

Treatment.—The patient must be placed upon his back, the scrotum thoroughly cleansed and irrigated with bichloride solution, 1 to 1000, and then elevated, and cooling lotions should be applied. Free purgation is often beneficial, and anodynes may be required to relieve the pain. In mild cases improvement begins in a few days, and but little suffering is experienced. In many cases the effusion continues and the condition of the patient renders an operation necessary. Under these circumstances it is best to perform Volkmann's operation (see p. 337), with removal of the clots, and then search for the bleeding vessels.

Chronic Form.—Chronic hæmatocele of the tunica vaginalis testis

is a rare form of chronic inflammation of that closed cavity, and is in reality chronic hydrocele with blood-effusion. The course of this affection is slow and, as a rule, painless. With the progress of the case more or less structural change takes place in the vaginal tunic, which becomes moderately and even greatly thickened. The blood contained in the vaginal tunic may be fluid, clotted, or coagulated into laminæ. In proportion to the density of the cell-infiltration around the testis that gland is more or less compressed, and in some instances atrophy results.

This form of hæmatocele is found usually in persons of middle age, even to the sixtieth or seventieth year.

Upon examination of this form of hæmatocele we find a rather large round or oval tumor, with smooth walls, and having a tense but elastic feel.

As a rule, the history of the case and the condition of the tumor will render a diagnosis quite clear.

Treatment.—Such is the sluggishness of the course of chronic hæmatocele that patients, as a rule, do not apply early for relief. As a tentative measure, compression may be employed and applications of mercurial ointment or ichthyol may be tried. When, owing to the size and weight of the tumor, it becomes evident that surgical intervention is necessary, we may resort to Volkmann's operation (see p. 337) or, when the tumor is of very large size and there is evidence of testicular disorganization, it is well to remove it.

Parenchymatous Hæmatocele.—This also is a rare form of acute testicular lesion. It is always the result of traumatism, and consists in a moderate effusion of blood into the structure of the testis, and perhaps into the epididymis. Persistent pain is a marked symptom. The testis may be more or less enlarged, and in some cases a small area of fluctuation may be felt.

Treatment.—Rest in bed, with the scrotum suspended, and the application of cooling lotions, are necessary in recent cases. In some cases in which fluctuation can be felt, it may be necessary to make a free incision and then pack the wound with iodoform gauze. A cutting operation, however, should not be resorted to until all other means fail.

Hæmatocele of the Epididymis and Testis.—In some very rare instances the large and small cysts seated around the head of the epididymis and upon the body of the testis may (see p. 338), as a result of traumatism, become the seat of hæmatocele. The parts then become swollen and painful, but full resolution may take place.

Treatment.—As a rule, rest in the recumbent position and suspension of the affected testicle, together with the application of cooling

lotions, will cause subsidence of the affection. In chronic cases a modified Volkmann's operation may be necessary.

Hæmatocele of the Cord.—Hæmatocele of the cord is very rare, and may occur in a *diffused* or in an *encysted* form.

Diffused Hæmatocele of the Cord.—Diffused hæmatocele occurs quite suddenly from rupture of a spermatic vein during violent exertion, as in lifting a heavy weight, or in consequence of a blow on the parts or during the act of copulation and sudden intra-abdominal pressure. The swelling is usually cylindrical, extending from the upper part of the scrotum to the external ring, and may attain very large proportions. The parts lying over the tumor are unaffected unless the lesion is a result of contusion.

The **symptoms** of diffuse hæmatocele of the cord are sometimes slight and sometimes severe. On palpation the tumor is found to be firm but doughy, with ill-defined outlines. The course of diffused hæmatocele of the cord is, under favorable circumstances, toward gradual subsidence; in some instances severe inflammatory action is set up. Ultimately the cord is left in a normal condition or perhaps a little thickened.

The **diagnosis** of diffuse hæmatocele of the cord usually offers no difficulty. The history, position, and general features of the swelling are unmistakable. An important point is the absence of impulse on coughing.

Treatment.—During the acuteness of the affection the patient should remain in bed and cooling lotions should be applied to the part. In the chronic condition, blisters may be freely used and graduated pressure may be tried. As a rule, full absorption of the exudates occurs.

Encysted Hæmatocele of the Cord.—Encysted hæmatocele of the cord is very rare, and is due to effusion of blood into a cyst or an encysted hydrocele in consequence of injury. The resulting tumor is small and round or oval, but is not translucent. As a rule, encysted hydrocele of the cord is unattended with marked symptoms.

Treatment.—When the encysted hæmatocele is large enough to cause discomfort it may be necessary to make an incision into it, to turn out its contents and pack its cavity with iodoform gauze, all being done with strict antisepsis.

STRANGULATION OF THE TESTIS AND EPIDIDYMIS FROM TORSION OF THE CORD.

There are in medical literature less than twenty-five cases recorded in which the testicle, seated either in the inguinal canal or just in the scrotum, became acutely swollen and painful as a result of torsion of the spermatic cord. Of these cases the majority were those of

boys from thirteen to twenty-one years old, while in the great minority were old men and young children. In most of the cases there is a history or evidence of undescended or imperfectly descended testis; consequently, as a rule, the swelling is found in the inguinal canal or just within the upper part of the scrotum. The objective symptoms are localized swelling, œdema, and redness. The subjective symptoms are varied, and they may point to strangulation, hernia, traumatism, or inflammation of the appendix vermiformis. These are pain, fever, and frequently constipation and vomiting, which, however, is not stercoraceous. As distinguished from hernia, it will be noted that the constipation is not so persistent, the shock is decidedly less, and there are no abdominal symptoms. The tumor is harder than that of hernia, and is absolutely without impulse and is irreducible. Though the location and quite sharp localization of the tumor, together with its history and concomitant symptoms, point very convincingly to the testis (and it is absent from the scrotum in the majority of cases), it sometimes happens that a diagnosis is not arrived at until an exploratory incision has been made. Then the testis and epididymis are found to be swollen, of a deep-blue or even black color from hemorrhagic infarction, and sometimes it is gangrenous. When the tumor is below the internal ring the finger-tip pressed over that part will show that the case is not one of hernia. Hernia may be found as a complicating condition of this accident to the testis.

The exciting **causes** of torsion of the cord are, in the main, excessive labor and violent and sudden strain. In some of the reported cases no exciting cause whatever could be ascertained, and in some instances the condition developed while the patient was asleep.

Usually torsion of the cord leads to destruction of the testicle unless promptly relieved.

The twist of the cord may be partial or complete, or the cord may be twisted several turns. The essential and underlying cause of torsion of the cord is due to disturbance in the development of the vaginal process of the peritoneum, in which the mesorchium is either too slender or too long, and hence does not give the testis the necessary amount of fixation. The mesorchium then allows greater movement than normal, and the testis may, as a result, encounter difficulty in entering the inguinal canal and impediment in traversing it. When it is in the inguinal canal the flat condition of the organ militates against its replacement, and renders this impossible as soon as inflammation has become established.

Treatment.—When it occurs in the scrotal sac, torsion of the cord may be reducible by taxis. Hemorrhagic infarction of the testis and epididymitis calls for prompt incision and extirpation.

EPIDIDYMO-ORCHITIS FROM URETHRAL EXPLORATIONS AND OPERATIONS.

The introduction of bougies, sounds, and catheters into the urethra for various conditions is not infrequently followed by epididymitis or epididymo-orchitis. In the course of gradual dilatation for stricture and for chronic urethritis, as a result of catheterism in retention of urine in acute gonorrhœa and gonorrhœal congestion of the prostate, and in the retention which sometimes follows severe operations, chiefly about the rectum and abdomen, and also elsewhere, inflammation of the testicle sometimes occurs. In young and old subjects, upon whom lithotrity, litholopaxy, and lithotomy have been performed, the testicle may become damaged. This accident not infrequently occurs when a catheter or other instrument is tied in the bladder.

In cases of hypertrophy of the prostate, in which the necessity for the introduction of the catheter is more or less urgent, testicular inflammation is not very uncommon. In many of these cases the testicular complication may be traced to the use of too large a catheter, to one which has by age become rather rough, and often to dirt which has been carried on the catheter owing to the patient's carelessness.

While, in general, the symptoms of this, as we may call it, traumatic epididymo-orchitis resemble those of gonorrhœa, they present certain somewhat distinctive features. As a rule, the testicular inflammation comes on quite promptly after the receipt of the injury. Then, again, the onset may not occur for several days, and then may be slow, halting, and intermittent. In the cases where the inflammation is slow in development its course is usually prolonged, and resolution comes on rather tardily. In some cases, however, the invasion is rapid and brusque, and in these particular cases we not unfrequently observe quite prompt, even markedly rapid, resolution.

The **physical signs** differ in various cases according to the mode of invasion. In the slowly-developing cases the patient may suffer little pain, and may discover, sometimes by accident, that the tail or head of the epididymis is somewhat swollen, hard, and perhaps a little tender on pressure. The swelling may then increase slowly, limited to one part of the epididymis, or it may spread and involve the whole of it. It then feels like a hard, firm, quite bulky crescent seated on the testis. This condition may remain indolent for a varying period, and it may quite fully disappear, or it may lead to a permanent swelling and induration of the epididymis. There may be a concomitant moderate effusion into the tunica vaginalis.

The **course** of the case in which the onset is brusque and rapid is, in the main, quite like that of acute gonorrhœal epididymo-orchitis. Abscess, however, is more frequent than in the latter condition.

In a goodly proportion of young and middle-aged patients this post-instrumental inflammation is limited to the testicle, with sometimes the involvement of the tunica vaginalis. In a rather larger proportion the epididymis is attacked. In elderly and very old men, while the process may be limited to the epididymis, it more commonly attacks the testis also. In these cases the epididymo-orchitis may be slow in development or the onset may be quite rapid. When the testis is involved there is usually much pain.

Abscess of the epididymis, of the tunica vaginalis, and particularly of the parenchyma of the testis, is a not uncommon accident. Abscess of the testis in old men may lead to the total extrusion of the gland and its appendages. This sequela may be quite rarely observed in young and middle-aged men.

The **treatment** is the same as is directed for gonorrhœal epididymo-orchitis. (See p. 121 *et seq.*)

ORCHITIS DUE TO MUSCULAR CONTRACTION.

So many cases have been reported in which epididymitis and orchitis, separately or combined, have developed as a result of muscular injury that to-day this causative factor is quite generally admitted. In these cases the pain on the receipt of the injury may be at first slight, and may gradually become severe, or it may be violent and sickening from the first.

In most cases the left testis is affected, and the clinical picture resembles that of gonorrhœal inflammation of these parts.

There is considerable divergence of opinion as to the mechanism of the traumatism in these cases, in which patients slipping with violence, lifting heavy weights, and by any means rudely shaken become attacked by testicular pain and inflammation.

According to one view, violent contraction of the abdominal muscles, particularly of the fibres of the rectus abdominalis muscle, which are present in arched form over the cord at the external abdominal ring, injures the cord, and the inflammation then descends to the testis.

Another view held is that the injury results from violent contraction of the cremaster muscle, which jerks the testis against the pillars of the external rings by what is called a whip-snap action.

In all probability the mechanism of the injury is as follows: Owing to violence in coughing, straining, or to sudden wrenching of the body, the abdominal parietes and diaphragm contract and thus bring strong pressure to bear on the spermatic plexus of veins, which are poorly provided with valves and loosely surrounded with connective tissue. As a result, rupture of the veins may occur in the cord, in the epididymis, or in the substance of the testis.

In addition to this action, spasmodic contraction of the cremaster and of the fibres of the rectus muscle may also, in some cases, play an accessory part. In many cases of this form of orchi-epididymitis the patients have previously been free from venereal diseases, gonorrhœa especially. There can be no doubt that a latent subacute inflammatory condition of the testis or cord may be transformed into an acute condition by means of muscular traumatism.

This form of testicular trouble usually goes on promptly to resolution, though induration of the epididymis and enlargement of the testicle may result.

The **treatment** is the same as is directed for gonorrhœal epididymo-orchitis. (See p. 121 *et seq.*)

ORCHITIS AND EPIDIDYMO-ORCHITIS DUE TO VARIOUS INFECTIOUS DISEASES.

Inflammation of the testicles, alone or in combination with epididymitis and vaginalitis, may also occur as a complication of a number of infective diseases.

In the course of mumps the testicle may become painful, swollen, and hard. The affection called mumps, or parotidian orchitis, may be limited to the gland and it may involve the epididymis and the tunica vaginalis. The onset of this inflammation is brusque and its course rapid, so that in from three days to a week it may cease. Involvement of the second testicle sometimes occurs. In this form of orchitis resolution may be perfect, but not uncommonly total atrophy occurs.

During the course of small-pox the testicle, its tunica, and its appendages may be attacked with more or less violent inflammation. This complication may occur in men who have previously suffered from gonorrhœa and in those who have not.

Orchitis accompanied by epididymitis and vaginalitis is a very rare complication of scarlet fever. Two cases have been reported as occurring in boys six and eight years old.

There have been so many cases reported in which orchitis developed during malarial fever, and for which no other pathogenic cause or condition can be assigned, that it seems reasonable to accept the latter as cause and the former as effect. One testis or both may be attacked. The clinical picture is that of acute orchitis. The tendency of the disease is to quite prompt resolution, after which, in some cases, atrophy may occur and an indurated epididymis may be left. The pain incident to this inflammation is usually severe, sometimes continuous, and, again, it may be intermittent. Quinine has an excellent effect in aborting and causing the resolution of this inflammatory process.

There is abundant evidence to prove that influenza, or *la grippe*,

may be the exciting cause of orchitis in subjects who have never suffered from gonorrhœa or any inflammation of the urinary tract. This infectious disease also has been known to cause recrudescences of epididymitis and orchitis in organs previously the seat of gonorrhœal inflammation. The physical signs generally are those of acute gonorrhœal inflammation, but, as a rule, resolution occurs more promptly.

In some cases of grip-orchitis there is a mild mucopurulent urethral discharge.

When uncomplicated these testicular affections due to grip run an acute course and quite rapidly go on to complete resolution.

During the course of pneumonia and for some time after its defervescence inflammation of the testicle or epididymis may occur as a result of that infective process.

Testicular inflammation occurs somewhat rarely during the course of typhoid fever, Leibermeister having found two instances in 200 cases. Generally, it is toward the end of the fever that the epididymis is attacked, either in a subacute or a brusquely acute manner. There is usually a concomitant rise in the temperature and an ephemeral return of the general symptoms. In some cases this complication appears early in the disease, and in others after full defervescence and cure.

Usually this form of epididymitis is unilateral, and resolution takes place slowly, leaving no trace after it. Then, again, induration has been known to follow. In some cases the testis and vas deferens are attacked.

Several cases have been reported in which during typhoid fever chronic urethritis has undergone recrudescence, and epididymo-orchitis has resulted.

During the course of pyæmia and of grave phlegmonous inflammation in bones orchitis may supervene.

It is claimed by some authors that during and following the course of tonsillitis, whooping-cough, acute articular rheumatism, and gout an inflammation of the testicle etiologically related to these morbid conditions may occur. The treatment of these anomalous forms of testicular inflammation is, in the main, that directed for gonorrhœal epididymo-orchitis. (See p. 121 *et seq.*)

CHRONIC ORCHITIS AND EPIDIDYMITIS.

The testis and the epididymis are liable to be attacked by such a degree of chronic inflammation in young, middle-aged, and old subjects that the function of the gland may be destroyed by the indurating and atrophic processes which supervene. In many of these cases there has existed as a starting-point gonorrhœal epididymitis, or epididymo-

orchitis; in some, however, the gland had previously been healthy. In none of them is tubercular infection an exciting or predisposing cause.

In some cases of chronic posterior urethritis and of stricture of the urethra, usually in careless sexually indulgent subjects, the epididymis and in some cases the testis may be attacked by a mild form of inflammation, which does not cause the patient to go to bed, or these structures to become much swollen or painful. Such an attack usually soon subsides, and is followed at a greater or less interval of time by a recrudescence, which in its turn is followed by another attack, and so the case continues for years. Some relapses are more severe and inflammatory than others. When examined, such an epididymis is found to be enlarged usually in its whole length, the swelling being quite uniform

Fig. 90.

Chronic orchitis and epididymitis.

and diffuse and not nodulated at any point. (See Fig. 90.) Thus is produced a hard, firm, perhaps painless, sclerotic crescent, which is attached to the back and upper and lower part of the gland. The lesion not being of a tubercular nature, degenerative changes, such as abscesses and necrosis, are not observed, but as time goes on the sclerosis gradually destroys the efferent spermatic tubes and produces azoöspermatism of one

and not infrequently of both sides. The testis, when it is attacked, may become rather larger than normal or it may decrease in size. As a rule, patients thus affected being young and well, and observing for a long period no diminution in their sexual desires and in their ability for copulation, pay little heed to their testicular trouble. Later on, in cases of double epididymitis or epididymo-orchitis, the sexual appetite and the capacity for coitus may begin to wane, and the affection becomes a source of anxiety and apprehension. In the case of unilateral involvement there may be no functional impairment unless the unaffected testis becomes diseased from any cause.

This form of chronic epididymo-orchitis being so persistent, so liable to undergo exacerbation, and so rebellious to treatment, is really a serious affair, and it calls for careful local and urethral treatment.

The clinical picture above portrayed will apply to cases of young and old subjects usually having chronic gonorrhœa or stricture of the urethra, in whom it is necessary to pass for long periods of time urethral instruments; also to cases in which lithotrity, litholapaxy, and lithotomy have been performed. In these cases, however, abscess of the testis may occur.

In some old men having hypertrophy of the prostate, cystitis, and that low-grade form of chronic gonorrhœa which is not uncommon, a slow, usually painless fibroid enlargement of the whole epididymis, and perhaps of the testis, may not uncommonly be observed. In nearly all the cases in which the testis is the seat of chronic enlargement there is more or less involvement of the epididymis, but the latter structure may be attacked without there being any perceptible change in the testis itself.

Treatment.—In those cases in which chronic orchitis and epididymitis seem to have been caused and perpetuated by such urethral lesions as chronic urethritis and stricture, the essential point is to treat these conditions locally and to cure them. Cases in elderly men in which prostatic hypertrophy is an exciting cause should receive treatment directed to the prostate. When surgical operations (lithotomy, lithotrity, and litholapaxy) have been followed by inflammation and congestion of the prostatic urethra, complicated with testicular involvement, systematic topical treatment of the urethral canal is imperative.

All patients suffering from chronic orchitis or epididymitis should wear a nicely-fitting suspensory bandage at all times during the day.

(For local treatment of the testicle, see p. 124 *et seq.*)

ATROPHY.

Atrophy of the testis is not very uncommon, and is due to a great variety of causes.

In the young subject the gland may become dwarfed by reason of abnormal retention and of malposition or ectopia. In old subjects, senile changes begin earlier in the testis than in other parts of the body, and the organ may be reduced to a mere mass of fibrous tissue without any trace of glandular structure.

As a complication in the course of a number of infectious diseases the testis is not infrequently involved, and the outcome is very often atrophy or structural degeneration.

Gonorrhœa may, in rather exceptional cases, end in testicular atrophy, but its danger to the sexual capacity resides in its tendency to occlude the spermatic tubes.

Syphilis is a potent and frequent factor in the production of atrophy of the testis and of the epididymis, and occupies a prominent place in the category of causes of sexual impairment and sterility.

Hydrocele and hematocele may lead to moderate and temporary or permanent azoöspermatism by reason of the structural atrophic changes which they produce in the testis and epididymis.

It is doubtful whether varicocele produces true atrophy of the testis, except in very rare instances.

In a certain number of cases of elephantiasis of the scrotum true atrophy of the testis has been observed. In some forms of hemiplegia, general paresis, and in some cases of traumatism of the skull, brain, cerebellum, medulla oblongata, and spinal cord, wasting of the testes is observed. In these cases the spinal sexual centre is so affected that its function is destroyed. The long-continued use of iodide and bromide of potassium and belladonna has been stated to be the cause of atrophy of the testis.

TUBERCULOSIS.

Tubercular infiltration is one of the most common affections which attacks the testis and destroys its function. It is observed chiefly at and during puberty and in adult life, but may be found in infants, and much less frequently in middle-aged and elderly men.

In all probability, tubercle of the testis is developed secondarily to some other more or less remote focus of infection of the body, and it is chiefly noted as being found in association with tuberculosis of the prostate, seminal vesicles, and bladder and ureters and kidneys. Though some cases, from a clinical standpoint, seem to be instances of primary testicular tuberculosis, it is not well to venture such a diagnosis with

much positiveness, since lurking and perhaps dormant foci of infection may exist in some part of the body which can only be detected by post-mortem examination.

As to the avenues by which the testis is invaded, it may be stated that clinical, anatomical, and pathological facts point to the bloodvessels as the carriers of the infective material.

There is no scientific evidence at hand in favor of the view that primary infection through the urethral canal may in some obscure way occur and lead to testicular invasion.

There is good reason for supposing that infection of the seminal vesicles and prostate may occur through the vesico-rectal peritoneal fold from tuberculosis of the peritoneum.

In clinical practice we find two quite clearly marked forms of tubercle of the testis—namely, the acute and the chronic forms. Besides these forms we find mixed varieties, in which acuity and chronicity are blended.

The acute form of tuberculosis of the testis presents somewhat the same clinical picture as is offered by acute gonorrhœal epididymitis. The patient may have given evidence of tuberculosis in some other and perhaps remote organ; he may or may not have complained of bladder, prostate, or urethral disorder; and he may or may not have suffered from gonorrhœal epididymo-orchitis. He may have previously enjoyed good or fairly good health, or the testicular lesion may appear as the only local evidence of disease in a man who is pale, weak, and sickly, and who, perhaps, has within a short time lost flesh. In many cases traumatism seems to be the exciting cause.

Usually the first symptom is pain seated in the head or the tail of the epididymis, and very soon the segment involved swells to considerable size. In some galloping cases the whole epididymis is much swollen in all directions, is either spontaneously painful or on slight pressure, and is covered with an acutely inflamed area of scrotal tissue in a day or two. In other cases several days or even two or three weeks elapse before such an acute condition is reached. In these cases there is usually more or less fever and malaise. When palpated in this state the epididymis usually does not present any diagnostic points, and the conclusion may be reached, if there is any evidence of urethral discharge, that the case is one of gonorrhœal epididymo-orchitis in the declining or chronic stage. When the entire absence of any urethral discharge or affection is rendered clear, the suspicion of tubercular invasion may be entertained.

In a few days or in a week or two, upon the subsidence of the severe inflammatory reaction (in cases in which an abscess has not been formed, and in which vaginalitis has not developed), the surgeon can carefully

examine the organ, and then, or perhaps later, a nodular or bossy condition of the head and tail and perhaps of the body of the epididymis may be clearly made out. At this time the testis may appear uninvolved, but later on it may become more or less enlarged, and on its surface small or large nodulations, just as if small shot or split peas were seated in the tissue, can be felt.

It sometimes happens that the seminal fluid becomes of a rose color from blood admixture, probably derived from some part of the testis. Abscess may sooner or later develop, usually at the head of the epididymis, and also at the tail. When the tail of the epididymis is attacked it is not uncommon to find a mass of suppurating tissue about an inch or less from it and connected by a fibrous strand in the loose scrotal tissue. These extra-epididymal abscesses seem to be due to infecting pus which escapes from the involved epididymis.

Abscess is the direct outcome of the caseation and softening of the tubercular inflammation. The non-vascular cellular nodules produced by the infective process, and the infiltration which surrounds, compresses, and destroys the seminal tubules and leads to a chronic diffuse orchitis, break down and give issue through one or several fistulæ to a thin fluid streaked with pus and small grumous masses. The scrotal wall becomes of a deep red, even of a bluish-red, color, and the orifices of the fistulæ look very unhealthy. In the cases thus briefly described there is usually more or less destruction of the testis proper, but the function of the gland is promptly destroyed by the deadly infective invasion which attacks it in its centre and on both flanks. One testis may be thus attacked, but not very frequently the other one is sooner or later involved.

In the chronic form of tuberculosis of the testis many clinical pictures are presented. In some cases, in apparently healthy or in sickly-looking subjects, with or without coexisting urethral, prostatic, and vesicular involvement, the epididymis (tail or head) swells painlessly, and the patient by accident discovers a small pea-sized or hickory-nut-sized nodule of irregular outline. This condition may slowly increase, and as it does the infiltration becomes more rugose upon its surface, and it may extend to the whole epididymis, converting it into a fibrous mass. In this painless indolent state it may remain for a long time—months or years—or caseation, softening, and fluctuation may be discovered, or abscess or fistula may develop. On removal of such a testis the epididymis is found to be very tough and fibrous, with here and there cavities in which degeneration has occurred. Very often no evidence of invasion of the testis can be found.

In other chronic cases there may be synchronously observed separate nodules of small or large size in the head and tail of the epididymis,

with what is then most common, the involvement of the whole mediastinum testis. In these cases the disease may remain latent and indolent for varying periods (often quite long ones), or exacerbations may occur, and the case in its course may then resemble those of acute development. In general, however, the infective process goes on, the chronic epididymo-orchitis keeps on its course, and then we find a much enlarged epididymis, which is hard, knobby, and irregular. In some cases the lesion in the epididymis preponderates, and then that appendage is very large indeed, and the, as yet, uninvaded testis forms but a small portion of the morbid tumor. Then, again, the growth in the testis keeps pace with the process in the epididymis, and a large mass is produced. (See Plate XII.)

Hydrocele is observed in about one-third of the cases of tubercle of the testis. In some exceptional cases tuberculosis of the testis (one or both) presents the same clinical picture as is offered by syphilitic sarcocele. By slow degrees, with some or little pain, the testis and epididymis enlarge and form an ovoid or pear-shaped tumor, which has a smooth surface and hard, firm consistence, and which may be mistaken for syphilitic sarcocele or cystic sarcoma of the testis. These tubercular testes may be as large as a good-sized pear or as a large fist. They may remain intact for a long period, and they may become the seat of abscess and fistula and of fungoid development. In some of these cases I have observed small and large rounded nodulations on the surface of the testis. It is always difficult and often impossible in this form of tuberculosis of the testis to discover the epididymis or to settle in one's mind how much it contributes to the general swelling, since the parts are so intimately merged together.

The life-history of patients suffering from tubercle of the testis is that of tuberculosis in general. In some cases the patients live for years after the extirpation of the organ or organs ; in others death follows sooner or later from extension of the disease to vital organs.

Besides the strikingly well-marked features presented by the affected testis, there is, in most cases, evidence of prostatic involvement in the shape of enlargement and large and small nodulations, and perhaps of irregular infiltrations in the ampullated ends of the vasa deferentia and of the seminal vesicles, which may be ascertained by digital examination in the rectum.

In many cases of tubercular testis the scrotal part of the vas deferens is more or less attacked. There may be slight thickening and enlargement, circumscribed or diffuse, or the tube may be so nodulated that it feels like a string of beads of various sizes. A testis attacked by tuberculosis soon ceases to possess the spermatogenic function.

In all probability, tubercular invasion of the epididymis and testis

PLATE XII.

TUBERCULOSIS OF THE TESTICLE AND EPIDIDYMIS.

destroys the function of the gland much sooner and more frequently than we have heretofore thought. It must be remembered that even in mild and indolent cases the development of toxins occurs in association with the morbid tissue-changes, and these poisons permeate the structures of the testis and destroy the delicate arrangement by which the spermatogenic function is performed. In very acute cases the extensive swelling and hyperæmia are undoubtedly largely due to the diffusion of the poisons through the whole gland. It is fair to assume that this condition destroys the function of the testis at once. Then, in addition to this diffusible poison, the cell changes so destroy the integrity of the gland that it soon becomes useless as a producer of spermatozoa.

Involvement of the two glands carries with it sterility. The foregoing considerations show what a widely deleterious influence tuberculosis exerts upon the sexual function.

Treatment.—The most important point in the management of cases of tuberculous testes, and in which other organs and tissues (lungs, kidney, bladder, prostate, vesicle, etc.) are attacked, is the removal of the patient to a suitable climate which is high, dry, and sunshiny—the Adirondacks, Southern California, and Colorado. In all cases it must be remembered that climate is the chief curative factor, and that the action of drugs is only secondary. Benefit, however, may result from the use of cod-liver oil, the hypophosphites, creasote, iodide of iron, and tonics, all of which should be judiciously employed. The adoption of surgical measures depends wholly upon the extent and seat of the tubercular lesion.

If there are indurated masses in the epididymis or in the testis these points should be incised, thoroughly scraped, and packed with iodoform gauze.

If there are sinuses leading into the epididymis or testis, they should be enlarged, scraped, and packed with absorbent gauze or iodoform ointment.

When the entire testis is extensively involved and broken down it is necessary to resort to castration; but in these cases the necessity of climatic change should be forcibly impressed on the patient.

CYSTIC SARCOMA.

This form of testicular tumor (and the parotid gland is sometimes similarly affected) is rare, and is found in the proportion of about three in one hundred cases of malignant disease of the testis. It occurs most frequently between the ages of twenty and forty, a large number of cases having been noted between thirty and forty and a smaller number between twenty and thirty. It may occur in early and in late life, but the cases of its very late development are quite rare. As a rule,

but one testis is attacked. It runs its course to a fatal termination in from one to two years.

The disease begins insidiously, without marked subjective symptoms. As the growth increases, a smooth, hard, firm, sometimes densely elastic, indolent tumor is produced. Spontaneous pain is not present, and the patient simply complains of a dragging sensation and the impediment offered by the size of the tumor. Hydrocele is sometimes a complication. Being smooth, hard, and firm in its commencement, this form of testicular degeneration may be diagnosticated as syphilitic, so much does it resemble syphilitic sarcocele. But the touchstone to the diagnosis lies in treatment. It is always well in these cases, if the history is misleading or negative, to put the patient under active local and general antisyphilitic treatment. If the disease is of specific origin, the morbid process will be arrested and the swelling will gradually subside. If it is of malignant nature, it will go on increasing in spite of medication, and then the surgeon knows that ablation is necessary. Usually the surface of the tumor in its early development is smooth, but sometimes it becomes nodular, rugose, or bossy quite early. In this event the suspicion of malignancy is warranted. In the course of time the morbid growth becomes exuberant and fungating. (See Plate XIII.)

Pathology.—The morbid structure of these tumors is not generally well understood. Thorough microscopical study of a typical case observed by me developed the following facts:

The testicle was largely composed of a congeries of variously sized cysts, the larger of which measured one-half centimetre. In places the cysts were closely approximated, communicating with each other and lined by thin walls.

The intimate structure was as follows:

1. Small regularly spherical acini lined with cylindrical epithelium. These corresponded to the typical adenoma portions of the tumor.

2. Very irregularly branching cavities, lined with less regularly disposed columnar cells. These cavities were on the border-line of carcinoma, and indicated a departure from the perfect adenoma type, so that the tumor was really adenocarcinoma. (See Plate XIII., Fig. 2.)

3. Very large cavities lined with epithelium and frequently filled with granular and fluid material. These represented cystic transformation of the adenomatous portions of the tumor.

4. Tiny islands of hyaline cartilage.

5. The remainder of the tumor was composed of closely packed small spindle-shaped cells or tissue in various stages of productive inflammation. The small spindle-celled tissue was arranged in the manner characteristic of sarcoma.

PLATE XIII.

FIG. 1.

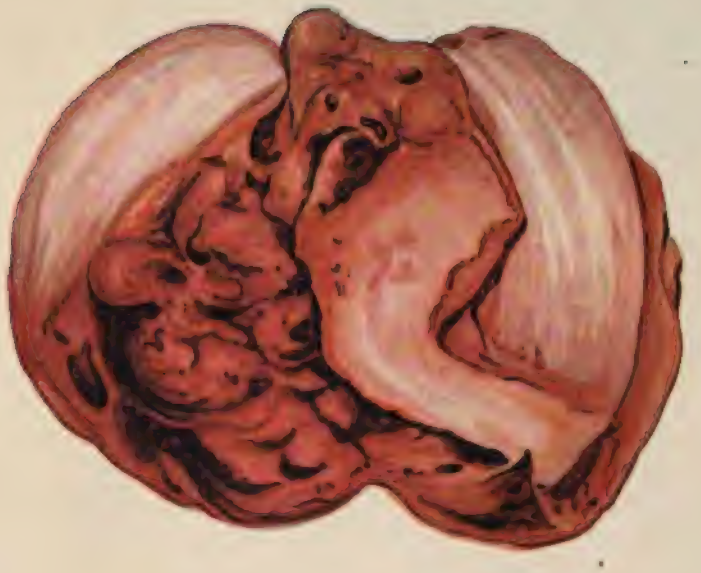


FIG. 2.

CYSTIC SARCOMA OF TESTIS.

The tumor, then, was complex and was composed of sarcoma, chondroma, adenoma, and cystic adenocarcinoma.

Treatment.—When the diagnosis of cystic sarcoma is definitely made, prompt removal of the affected organ should be practised.

Carcinoma.

Cancer of the testicle is usually encountered about middle life, but may occur much earlier or at a later period. It is the most frequent of all new growths of this organ, and may be of the medullary or the scirrhous type, the medullary, or soft, variety being the most common. As a rule, but one testicle is involved.

Its **etiology** is as obscure as is that of cancer in other glands or organs. Inflammatory conditions and traumatisms seem to be predisposing causes.

Beginning in the testicle or the epididymis, it finally involves the entire gland, eventually extending up the cord and invading the inguinal and retroperitoneal glands. The testicle increases in size, and is hard and smooth to the touch, and the veins of the scrotum are enlarged and tortuous. The cord becomes thickened and indurated. Pain is usually slight or absent. As the tumor increases in size it becomes soft and almost fluctuating, and adherent to the skin, through which it finally protrudes as a fungating bleeding mass. Unless proper treatment has been employed at the outset of the disease, the patient finally dies from exhaustion and involvement of other organs.

Treatment.—The testicle should be removed as soon as the diagnosis has been made, and the cord divided as far up as possible. The inguinal glands are to be removed, as well as the scrotal tissues on the affected side, even if they appear perfectly healthy.

Sarcoma.

Sarcoma of the testicle may occur at almost any time of life, but is usually encountered in young subjects and children. It may be made up of round cells, spindle-cells, or both combined, and very frequently a variety of abnormal tissues is present in these cases, when they are known as mixed tumors, or teratoma. (See Cystic Sarcoma, p. 357.)

The clinical course of the disease and the **treatment** are the same as those given for carcinoma.

Fibroma.

This is a very rare affection of the testicle, occurring in young adult life. It forms a hard, painless tumor, which grows slowly, shows no tendency to extend up the cord or to involve other structures.

Treatment.—The testicle should always be removed, for fear of possible malignant degeneration.

Enchondroma.

Cartilaginous tumor of the testicle resembles fibroma so closely that the description of the former, both clinically and as to treatment, is equally applicable to the latter.

Dermoid Cysts.

These cysts are congenital, and resemble similar tumors situated elsewhere in the body. They may contain cartilage, hair, teeth, bone, or skin, and are situated either on the surface or in the body of the gland. These tumors may interfere with descent of the testicle, or, as a result of pressure, they may cause imperfect development or atrophy of the gland. At about the time of puberty they increase in size, thus making their presence known to their bearers.

Treatment.—These cysts should, if possible, be enucleated from the testicle, the gland itself not being interfered with. This failing, however, the testicle to a greater or less extent will have to be removed.

Cysts (Cystoma Testis).

Scattered through the testicle in a fibrous tissue stroma, or associated with sarcomatous or carcinomatous tissues, are sometimes, though rarely, found cysts, varying greatly in size and number, and containing a clear or brownish or even bloody fluid. In some cases their contents are cheesy in consistence.

Treatment.—The testicle should be removed immediately and the cord ligated and cut as high up as possible.

CASTRATION.

The patient being properly prepared is placed on his back and etherized, an incision is made through the long axis of the anterior scrotal wall down to the tunica vaginalis, and the whole organ is shelled out *en masse* from the surrounding scrotal tissues, as in the radical operation for hydrocele. The tunica is opened and examined to exclude the possible existence of a hernia, and then the cord is stripped of its serous covering as high up as possible, and it is ligated with heavy silk or gut. To prevent the slipping of the ligature, it is best to have it transfix the cord, and then ligate each half separately and then again *en masse*. The cord is then cut as high as is deemed advisable and its individual vessels ligated with gut. All bleeding points are caught and tied, the wound-cavity wiped dry and the wound itself closed with sutures, or its dependent

part left open for a small rubber tissue-drain. The parts are dressed with sterile gauze and supported in the usual manner.

The above operation is performed in those simple cases where the disease is limited to the testicle, the tunica and scrotum not being adherent or involved. If, however, the tunica vaginalis and scrotum are adherent to the testicle, or the seat of disease, sinuses, or fistulæ, then the incision must be elliptical in shape and extend from the external ring well down to the bottom of the scrotum so as to include all such infiltrated and infected areas. The remainder of the operation is performed as above described.

CHAPTER XVI.

AFFECTIONS OF THE SPERMATIC CORD.[1]

VARICOCELE.

THE term varicocele is used to denote a varicose condition of the spermatic veins by which a generalized or localized swelling in the scrotum is produced. It is usually a mild affection, and occurs in well-marked form in about 10 per cent. of all male subjects. Many men have slight fulness and tortuosity of the spermatic veins who cannot be said to have varicocele.

This affection is, as a rule, developed slowly, insidiously, and painlessly. Again, it develops quite rapidly and with much discomfort to the bearer. In the vast majority of cases varicocele is found only on the left side.

While varicocele may sometimes be found in boys of twelve to fifteen years, it is mostly seen in adolescents and in men up to thirty years of age.

Etiology.—Various reasons are given for the constancy of occurrence of varicocele on the left side. The main cause probably lies in the fact that the left spermatic vein empties at right angles into the corresponding renal vein. Further, the left spermatic vein may sometimes be pressed upon by the sigmoid flexure, which is posterior to it and distended by fecal accumulation. Whether our modern method of "dressing" has any influence in causing enlargement of the veins of the left side of the scrotum is an unsettled question.

Varicocele is sometimes of congenital origin. Heredity may also be an underlying cause. There can be no doubt that vessel-tissue may, like other tissues, be transmitted in a condition of vulnerability. There is frequently found a coexistence of other vascular anomalies with varicocele.

Hernia and tumors in the groin, particularly when seated in or near the external ring, are liable to press on these veins and produce varicocele. Various other causes have been believed to induce this condition. For instance, it is stated by some authors that ungratified sexual desire and excessive venery are important factors in its cause. My opinion is, that as predisposing causes these perhaps may be considered as somewhat influential, since any condition which tends to

[1] See also Deferentitis and Funiculitis, page 114.

induce engorgement of the spermatic vessels is liable to aggravate this condition, and perhaps even to lead to its development. There is no scientific evidence whatever in support of the statement frequently made, that masturbation causes varicocele. On the contrary, the latter, by its irritating influence, may lead to the practice of masturbation. I have frequently seen the mild congestion of the spermatic veins of continent young men speedily pass away after marriage. Varicocele very often occasions more or less mental suffering in patients afflicted with it. Some patients, like many surgeons, regard it as the result of masturbation practised in early years, and fear that it will lead to impotency; while in others, again, its existence causes the most gloomy thoughts, which sometimes result in well-marked hypochondriasis.

Varieties.—The following forms of varicocele may be found:

There is, first, the elongated, diffused swelling, which extends from the external abdominal ring down to the testicle, which is larger high up than lower down;

The second form is that of a diffuse tumor surrounding the testicle, particularly its upper part, and extending halfway up to the external abdominal ring;

The third form is a goodly sized tumor just below the external ring and extending halfway down to the testis.

When a varicocele tumor is palpated, a sensation is conveyed to the fingers like that of a mass of earth-worms, and this simile is sometimes rendered all the more striking by the contraction of the cremaster muscle. Very often the scrotum is lax and dependent, and in its walls tortuous, flaccid veins can be distinctly seen. Under the influence of cold the scrotum and its varicocele contract materially, while heat and excitation tend to produce marked laxity and elongation of the parts.

Symptoms.—The symptoms of varicocele depend largely upon the size and condition of the tumor. When it is large, long, and dependent, the patient often complains of a sensation of weight, dragging, and of mild tension, which may extend to the groin, loins, and even to the lumbar region. All these symptoms may be aggravated by excessive heat and overexertion. In other cases patients suffer from a dull, aching pain, which has periods of intensity and intermission. A crampy pain is sometimes complained of in cases in which the tumor is very large. In all probability this pain is due to the tense condition of the cremaster muscle. The sharp pain sometimes complained of is, in all probability, due to spasm of the cremaster muscle associated with intra-abdominal pressure. Tenderness of the veins and of the cord is a not infrequent symptom, particularly in nervous, neurasthenic, and overanxious patients. Very often patients themselves produce this

symptom by repeated manipulation of their varicocele. Heat, over-exertion, jolting, and bicycling also excite this symptom temporarily. In many cases there are no symptoms whatever.

Varicocele consists in excessive development of the veins, the walls of which become thickened by cell-increase, and are subsequently the seat of fatty change, and, in some cases, even of calcareous degeneration. Phlebolites are sometimes found within the veins, while in general their valves are wholly effaced and their walls much thinned. Certain secondary changes in parts in connection with the spermatic veins often follow varicocele. For example, as a result of the weight of the venous tumor the scrotum sometimes becomes more or less redundant and relaxed and its walls much thinned. In such instances the power of the dartos muscle is more or less impaired. Further, in chronic cases a softened condition, with perhaps slight atrophy of the testis, is a not uncommon sequela; while early in the course of varicocele it is not unusual to find a slightly congested condition of this organ, due, of course, to the impediment to the return circulation. As a result of these changes, it often happens that ultimately the testicle grows gradually smaller, until in some cases it is reduced to the size of a pea and sometimes it seems to be wholly absorbed. Hydrocele is another not infrequent complication, but it is always of a subacute character and usually not very extensive. Thrombus of the veins is an occasional complication.

Patients sometimes attribute want of sexual power, due to other causes, to varicocele, and therefore demand relief. So importunate are some of them, and so deaf to reasoning, that the surgeon is forced to perform the operation for its mental effect. This condition of mind is mostly found in men beyond forty years of age.

Diagnosis.—The diagnosis offers no difficulties whatever, since simple inspection presents a striking clinical picture, and palpation reveals the worm-like mass within the scrotum. If the external abdominal ring is now compressed with the finger-tips and the patient told to stand up, the veins will be felt to be empty; then, withdrawing the pressure of the finger-tip, the sudden filling of the veins can be readily felt. A hernia when reduced may stay up; if it should come down, it forms a cylinder of decided calibre, which gives an entirely different sensation from that offered by veins filling with blood.

Treatment.—Palliative treatment may be of benefit in some cases. Much relief can be afforded by the use of cold douches and by attention to the condition of the bowels. Patients in a neurotic or neurasthenic condition should be treated symptomatically. Errors in sexual hygiene should be corrected, according to the indications in each case. Since physical exhaustion of any kind tends to aggravate varicocele, patients

should be put on their guard in this direction. When an operation is not admissible, much comfort is afforded patients by the use of a snugly-fitting and well-supporting suspensory. The surgeon should take pains to see that the bandage is suited to each case, since discomfort may be felt by a patient who indiscriminately purchases and wears a suspensory.

The radical cure of varicocele can be effected by a number of surgical procedures, many of which are complicated and attended with difficult after-treatment, and need not be mentioned.

The ideal operation for varicocele is the open one. The results of this operation are uniformly good. The parts are so clearly exposed, the ligatures can be applied with such precision, and the operation is so simple that it cannot be commended too highly.

It is necessary to remember that the veins to be excised are those of the pampiniform plexus, which is surrounded by a well-defined connective-tissue sheath. These spermatic veins lie well in front, while the vas deferens with its artery and veins is farther backward and inward in the scrotum. If the testis is carefully pulled downward, the vas is put on the stretch, and it can be easily felt, it being hard and firm like a whip-cord. The vas and the deferential artery and veins should be carefully avoided. Only by gross carelessness will they be included in the ligation of the veins. In that event there may be sloughing of the testicle from want of blood-supply.

THE OPEN OPERATION.—The patient is properly prepared for the operation and placed under the influence of ether, or the parts may be freely cocainized. An assistant holds the testicle firmly and draws it horizontally downward between the thighs. The parts are then tense, the veins can be distinctly felt, and under them the vas is very perceptible. An incision is then made for an inch and a half in the longitudinal direction and over the prominence of the veins. The edges of the wound are separated by retractors, and the coverings of the cord are carefully dissected until the sheath of the veins comes into view. It presents a shining, whitish-gray color, through which the purple veins are seen. This sheath of the pampiniform plexus, which must not be cut into, is then isolated by the knife, aided by the fingers, and then the ligatures, of strong silk, are to be applied by means of an eyed probe or aneurysm-needle about an inch and a half apart. In some cases a longer incision is necessary. The lower ligature is tied first, and then the upper one, the ends being left fully three inches long. The vessels are then cut with scissors about a quarter of an inch from the ligatures. The cut ends of the vein stumps are then brought together by knotting the ends of the upper ligature with those of the lower and cut off short. In this way the testis is drawn up to its natural position.

The wound is put on the stretch, so as to bring the edges of the scrotum in coaptation. This can be done with the fingers or by means of blunt hooks, one at each end of the wound. Two, or perhaps more, catgut sutures are now applied, thus firmly fixing the parts. A small opening in the dependent part of the wound is left for drainage. Usually no drainage-tube is necessary.

After the operation, the wound is dusted with antinosin or aristol and dressed with sterilized cotton and gauze. The first dressing may remain on for several days. Healing usually occurs in about a week or ten days. At first a callous mass will be felt at the point of juncture of the ends of the veins. This will gradually be absorbed, and in the end a little firm nodule will be felt. It is well to direct the patient to wear a suspensory bandage for a short time after any of the radical operations for varicocele.

Subcutaneous ligation of the spermatic veins is, in these days of advanced surgery, practically an obsolete operation.

Use of the Electrothermic Angiotribe in lieu of the Employment of Ligatures in the Open Operation for Varicocele.—According to Horwitz, the use of the electrothermic angiotribe in the open operation for varicocele is an ideal method of dealing with conditions of the kind, removing, as it does, the only objection that can be urged against the open operation—that is, the occasional infection of the ligature.

The dilated plexus of veins is exposed, separated from the vas deferens, and folded into a loop so as to shorten the cord to the desired extent. The base of the loop is grasped by the angiotribe, the part compressed, and the current allowed to pass for forty seconds; the battery is then disconnected and the loop above the jaws of the instrument is cut off.

On releasing the angiotribe the stumps resulting from the resection are found to be ribbon-shaped and firmly adherent, doing away with the necessity for the employment of sutures, which hitherto had always been necessary in order to unite the proximal and distal extremities. The incision is closed by means of two silkworm-gut sutures. The patient usually leaves the hospital on the eighth day after operation.

Horwitz employed the instrument devised by Downes, and claims for it the following advantages over the simple angiotribe suggested by Freeman: a more scientific, less crude and less dangerous method than that depending on violent traumatism in order to produce hæmostasis is substituted; there is less danger of secondary hemorrhage, and from thrombus; the operation is not followed by pain; the instrument is not conducive to the production of orchitis, a condition commonly attending operations in the vicinity of the cord.

SUPRAPUBIC OPERATION FOR VARICOCELE.—Under this title Thornburgh has recently described an operation for varicocele, which he claims affords a radical cure. The advantages of the suprapubic route are: The field of operation can readily be rendered aseptic; a dressing once properly applied will remain indefinitely, and will not be affected by the movements of the patient; primary union is a practical certainty. The parts being rendered surgically clean, the finger of the operator is introduced to the external ring, and a nick made with the knife directly over the tip of the finger. With this nick as a landmark an incision 3 cm. long is made, parallel to Poupart's ligament. The deep fascia is cut through with the knife, and then a little blunt dissection brings the cord into view. No bloodvessels of any moment are encountered, oozing being checked by hot normal salt solution. The sheath of the cord is picked up between mouse-tooth forceps and torn open. The finger of the operator is introduced, and the whole cord easily raised from its bed and brought out of the wound; a ligature-carrier is then placed beneath it. The vas is recognized by its white appearance and cord-like feel, and is separated from the rest of the cord downward to within an inch of the testis. The testis can readily be brought into view by gentle traction on the cord. The vas is separated from the vessels for about 6 or 7 cm. in an upward direction also. The vessels are tied with No. 3 cumolized catgut ligatures, the vessels between them (5 to 6 cm.) excised, the stumps inspected for oozing, the ends approximated, and the ligatures tied to each other, thus forming a support for the testis. It is unnecessary to isolate and save the spermatic artery and a vein. At the end of twelve days the dressings may be removed, and in three or four days more the patient may return to his usual occupation. A suspensory should be worn for at least six weeks following the operation.

My criticism on this method is this: That a rather severe operation, namely, the opening of the inguinal canal, is substituted for the simple incision through the scrotum.

ABLATION OF THE SCROTUM.—Formerly, in cases in which the scrotum was flabby and redundant concomitantly with varicocele, some surgeons attempted to afford relief by ablation of that portion which was excessive. The drawback to the operation was that in many cases the redundance of tissue reappeared as a result of the sagging of the varicose tumor. Owing to the simplicity and success of the open operation ablation of the scrotum is now rarely, if ever, necessary. If, however, the operation be decided upon, it should be performed on general surgical lines, a scrotal clamp being used to hold the tissues *in situ* and to guide the line of incision.

CHAPTER XVII.

AFFECTIONS OF THE SEMINAL VESICLES.[1]

ANOMALOUS conditions of the seminal vesicles occur so rarely that they are to be regarded merely as medical curiosities, and are therefore not described at length. The vesicles may be cut or injured during surgical operations or in general injuries, especially of and about the pelvis.

As a result of plugging of the ejaculatory duct, the vesicle may be converted into a cyst-like swelling, or tumor, which can be felt by rectal touch projecting upward above the prostate. Cases have been reported in which the tumor was of enormous size, holding a pint or more of fluid. These swellings may be aspirated, or, better, drained or excised through the perineum.

Malignant disease of the seminal vesicle never occurs alone, being associated with similar conditions in the adjacent structures, and is therefore not described.

TUBERCULOSIS.

Tuberculosis of the seminal vesicle is usually associated with a similar process in the testicle, prostate, deep urethra, or bladder, to which it is in the vast majority of cases secondary, although, of course, it may be attacked primarily by the tubercular process.

Symptoms.—There may be more or less increased frequency in urination, with post-mictional hæmaturia. The sexual desire, which is at first increased, finally becomes diminished, and, toward the end, extinct. Some patients suffer from painful nocturnal pollutions, which are more or less stained with blood. There may be a mucoid discharge from the meatus. All of the above symptoms vary greatly in different cases, depending upon the degree of involvement of the adjacent structures.

Diagnosis is readily arrived at from the patient's previous history, both personal and family, together with his present condition, and an examination of the vesicles by rectal touch. The vesicle feels like a distended, irregular sac or pouch running upward and outward from the base of the prostate; smooth and soft in some, and firm and nodulated in others, depending somewhat upon the stage of the disease. Pressure on the vesicle causes pain in some cases, while in others the

[1] See Sections on Acute and Chronic Inflammation of the Seminal Vesicles, pp. 104 *et seq.*

tumor is practically insensitive. If during the rectal exploration any secretion escapes from the meatus, it should be examined for tubercle bacilli, as should also the urine, especially that passed immediately after examination.

Treatment.—In the vast majority of cases, operative treatment is not to be thought of unless suppuration has occurred in the sac, when its contents must be evacuated through a perineal incision, the cavity cleaned and packed with iodoform gauze. These patients should be sent to a suitable climate and receive the regular treatment for tuberculous subjects.

If it can be ascertained beyond doubt that the seminal vesicle alone is affected, as it rarely if ever is, the surgeon may advise its removal by the perineal route, employing either the Rydygier, Zuckerkandl, or von Dittel incision; in any of these operations great care should be exercised not to wound either the urethra or rectum, the former being made prominent by a bougie, and the latter by a gauze packing.

CHAPTER XVIII.

AFFECTIONS OF THE BLADDER.

CYSTITIS.

Cystitis is a suppurative inflammation of the bladder, caused in the vast majority of cases, if not in all, by microbic infection in a bladder made vulnerable or susceptible from congestion of its mucous membrane.

For clinical and therapeutic purposes, it is best to divide cystitis into two stages, viz., acute and chronic, according to the duration of the attack and the severity of its manifestations. The mucous membrane of the prostatic urethra and that of the trigone and about the ureteral orifices are always most intensely involved in the inflammatory process, which, beginning in the mucous membrane about these regions, may in untreated or neglected cases finally involve the muscular and even the serous coats of the bladder.

Etiology.—The most frequent pathologic agent in cystitis is the colon bacillus (Bacterium coli commune); next in order is found the Streptococcus pyogenes. Cystitis due to these microbes may present varying clinical phases, but the urine is usually fetid in odor and acid in reaction. Upon long standing outside the body or in cases of retention with overflow and residual urine the Bacterium coli commune may produce decomposition of urea, with the liberation of carbonate of ammonium, which coagulates the pus into gelatinous, ropy masses and gives the urine its alkaline reaction and ammoniacal odor (ammoniuria). This decomposition is always secondary to cystitis, and is never the cause of the bladder inflammation. All pyogenic organisms apparently have the power of decomposing urea, with like results.

The most dangerous microbe is the proteus of Hauser. This bacterium exerts an energetic action in the decomposition of the urea, and, by means of the ammonia which it produces, may excite inflammation in a perfectly healthy bladder. In other words, without any tissue-predisposition, this microbe may cause cystitis by reason of the chemical irritant (ammonia) which it produces in urine. Although the Staphylococcus ureæ liquefaciens has been found in purulent ammoniacal urine, yet the exact causative relation of the microbe to cystitis has not been positively demonstrated. These two microbes,

together with the Streptobacillus anthracoides, certainly are pathologic to bladder-tissues, but further observations are necessary to clear up the doubt as to their being the primary agents of infection.

Although the genitals of both males and females swarm with microbes, innocent and pathogenic, it is interesting to learn that by careful culture Melchoir found the Bacterium coli commune and the Staphylococcus pyogenes aureus upon the prepuce, in the vulva and vagina, and upon the lips of the meatus in both. When to this knowledge is added the well-demonstrated fact that in the normal, and particularly in the diseased, urethra several forms of pathologic microbes are constantly present, it can readily be seen how easy it is to excite inflammation by the conveyance of these micro-organisms into a susceptible bladder by means of instruments.

Infection may travel backward from the urethra or prostate, or downward from the kidney or ureter, and also directly from the rectum, especially in the chronically constipated subject who suffers from hemorrhoids and whose prostate gland is more or less congested and diseased. The rough passage of sterile instruments may cause cystitis by the lighting into activity of microbes present in both the normal and diseased urethra.

Pyogenic microbes can be introduced into the healthy bladder with impunity provided there is no congestion of its mucous membrane and that the instrument causes none (traumatism). It must be borne in mind that normal urine in a normal bladder is absolutely sterile. The healthy mucous membrane has the power to resist micro-organisms, which power is lessened and finally lost by congestion.

Gonorrheal cystitis is in reality a mixed infection, in which the gonococcus plays a very insignificant part, the micro-organisms of other forms of cystitis outnumbering the gonococcus greatly.

In tubercular cystitis, the tubercular deposit or process first causes the necessary congestion of the vesical mucous membrane, which in time is followed by a true purulent cystitis; in other words, the tubercle bacillus antedates the advent of the pus micro-organism, for which it prepares a suitable soil.

The so-called catheter, calculus, tumor, prostatic, and stricture cystites are all in reality the same process, having different etiological factors, and therefore do not require to be considered separately.

The vesical congestion which is requisite, and prepares a suitable soil or culture-ground for microbic infection, may be caused by anything that retards or stops the free outflow of urine or that causes local irritation and congestion of the mucous membrane, as, for example:

Retention of urine, either partial or complete, from urethral stricture, prostatic disease, compressor spasm, or paralysis of the bladder

musculature, is invariably followed by more or less congestion of the bladder mucous membrane, which also results from the traumatism of calculi, rough instrumentation, foreign bodies, tumors, irritating irrigations, and overdistention of the bladder by too copious lavage.

Catching cold, chilling of the surface of the body, gout, rheumatism, irritating urine, etc., may give rise to a transient vesical congestion, but do not of themselves cause true cystitis, unless there is a subsequent germ infection or an already existing congestion due to an old posterior urethritis, urethrocystitis, stricture of the urethra, or prostatic disease, which is lighted into activity by the acute congestion of the vessels.

Long-continued ungratified sexual excitement, sexual excesses, and masturbation cause congestion of the prostate and the deep urethra, thus preparing a suitable soil for infection (cystitis) from any of the above-mentioned causes.

Pathology.—The acute or superficial variety of cystitis, beginning in and limited to the mucous coat, causes congestion and dilatation of the bloodvessels and a hyperæmic and œdematous condition of the mucous membrane in the region of the trigone, which in time may involve more or less of the bladder surface. The urine at this time is acid in reaction, and cloudy and opaque from pus, epithelium, and tissue-elements.

As the process passes into the chronic stage the mucous membrane assumes a yellowish-pink or gray hue, and its surface is seen to be thrown into folds or projections (trabeculæ) which are in reality due to hypertrophy of the bladder muscles, caused by the increased amount of work which they were called upon to perform during the acute stage. Enlarged vessels can now be seen coursing beneath the surface, to which may cling shreds of muco-pus, encrusted in some instances with urinary salts.

The urine is thick and purulent and filled with heavy clumps and shreds of tissue. Its reaction is alkaline and its odor often ammoniacal from the decomposition of the urea by the micro-organisms, with liberation of carbonate of ammonium, which changes the pus into clumps or masses of gelatinous material. A thick sediment is soon deposited on standing. If the disease progresses unchecked, it finally invades the submucous connective-tissue layer and muscular coat, constituting true interstitial cystitis, in which form both of the layers become infiltrated and thickened, and in some cases the seat of small pus foci or abscesses, which may rupture either into the bladder cavity or the perivesical tissues and structures, causing a pericystitis.

Under the heading of membranous, desquamative, or exfoliative cystitis is described a condition in which a more or less complete hollow cast of the bladder is voided with the urine or removed by operation,

the membranous cast or mould being made up of bladder epithelium held together by a fibrinous material.

Symptoms.—The symptoms of cystitis are liable to great variations, depending somewhat upon the etiology of the disease and whether it is acute or chronic in character.

In acute cystitis the urine is acid in reaction, and turbid from the presence of pus, mucus, and epithelium. In severe and very acute cases there is an admixture of blood from the congested mucous membrane of the vesical neck and trigonum. In most cases there is a marked increase in frequency of urination, with inability to hold the urine when the desire comes on, which becomes so marked in some that the patient has practically incontinence, the desire to empty the bladder of its contents being almost constant, and followed by severe pain and tenesmus and a few drops of blood-stained and thickly purulent urine. The intense irritation about the vesical neck now causes spasm of the compressor or bladder muscles, which, suddenly closing the urethra or causing violent bladder cramps, adds greatly to the patient's suffering, which at this period is most distressing, as he suffers constantly from suprapubic pain and tenesmus, with more or less inability to void the bladder of its irritating contents. These patients usually become very sick, having more or less fever with a high-tensioned pulse, dry and coated tongue, great thirst, loss of appetite, with nausea and perhaps vomiting. It is at this time that infection is liable to extend to the kidney by way of the ureters.

If stone, tumor, foreign body, prostatic disease, or tight stricture complicates the case, all of the above symptoms will be much more marked in character.

As the inflammation passes into the chronic stage, the urine, which was at first acid, becomes neutral and finally alkaline in reaction, with an ammoniacal odor. It now contains pus, blood, micro-organisms, and vesical and prostatic epithelium, together with triple phosphates, which conditions, if not corrected, are very liable to lead to stone formation, especially in prostatics with a deep post-trigonal pouch, and in cases of trabeculated and sacculated bladders the result of an intense and prolonged cystitis with obstruction to urination. All of the acute symptoms now become much less marked. The patient still has frequent urination, but he has more ability to hold the urine after the desire is felt. Tenesmus is mild or absent, and the constant acute and deep-seated pain over the bladder and in the pelvis is changed to a dull or dragging sensation; in other words, an acute process has been converted into a chronic one, which latter is liable to be lighted up by the slightest indiscretion on the part of the patient, or by too zealous examination and treatment on the part of the surgeon.

Prognosis.—The prognosis of cystitis depends upon the age of the patient, the cause of the attack, whether it is acute or chronic, and the kind and degree of obstruction to urination; also the condition of the bladder walls and musculature, and whether or not the kidneys have been attacked by an ascending infection from the bladder along the ureters. In young patients, therefore, with little or no obstruction and healthy kidneys, the prognosis in the vast majority of cases is good; while in older subjects, with damaged kidneys, trabeculated and weakened bladders, and marked impediment and obstruction to urination, the prognosis is always grave, although even in these severe cases, with improved technic for vesical irrigation, prostatic operation, and urinary antisepsis, both by internal and local medication, we are enabled to hold out more hope than formerly.

Treatment.—The treatment of cystitis depends upon the acuteness and intensity of the attack, the condition and reaction of the urine, and whether it is due to simple extension of an inflammatory process, a tubercular deposit, calculous disease, foreign body, or some form of obstruction to the free outflow of urine. In every case of cystitis the surgeon must first ascertain the cause and either remove it, or, if that is contraindicated at the time, he should treat it palliatively according to its nature. The condition of the kidneys must be ascertained by urinary analysis, and abnormal conditions treated on general medical or surgical principles.

In the acute stage of the disease the patient should be put to bed, and should be kept there until the subsidence of all acute symptoms. The diet consists of milk, weak tea, bland table-waters in not too large quantity, cereals with milk or cream, eggs, and breadstuffs, breast of poultry, plain soups and broths, a little fish, oysters, etc.; in short, a light, nutritious, and easily digested diet, avoiding all red meats and green vegetables, and anything that is highly spiced or seasoned. Alcohol in all forms, together with coffee, cocoa, and chocolate, should be strictly prohibited.

The secretory apparatus of the skin is to be kept in order by means of the warm bath, followed by an alcohol rub and gentle massage. The bowels must be regulated by mild cathartic pills, rather than mineral waters and salines, as the latter are apt to increase the urinary irritation. The local pain will be much relieved by the hot sitz-bath, and also rectal irrigations of hot saline solution, taken once, twice, or even more frequently during the day. Hot applications over the bladder and on the perineum will also add much to the patient's comfort. If, in spite of the above treatment, the frequency, pain, and tenesmus continue to distress the patient, we must then in a guarded manner employ suppositories of opium or belladonna and opium combined. These failing to

give relief, we may use codeine, opium, or morphine by the mouth, or, in extreme and very severe cases, morphine by hypodermic injection, always bearing in mind that it may have to be continued for some time, and therefore there is great danger of establishing the habit. If the urine is too acid in reaction, this may be modified by the internal administration of the bicarbonate, acetate, or citrate of potassium, in full doses, either alone or combined with a little tincture of hyoscyamus or laudanum for their quieting and soothing effects; also liquor potassæ, with laudanum, uva ursi, and triticum repens. Bicarbonate of sodium in Vichy water gives the same result, and, taken cold, is a pleasant and refreshing drink.

These cases must be carefully watched for retention of urine, which may add greatly to the patient's distress, and, if not relieved by the hot bath and rectal irrigation, gentle and sterile catheterization must be resorted to, under local or even general anæsthesia in very sensitive subjects. If the soft-rubber catheter fails, the surgeon may then employ a woven one; and this also being unsuccessful, a silver catheter can be tried, or suprapubic aspiration performed, according to the nature of the obstruction and the requirements of the case.

In a small minority of cases, in spite of the above treatment, the frequency in urination and painful tenesmus may continue, and can sometimes be relieved by the instillation of a few drops of nitrate of silver solution (two grains to the ounce) into the deep urethra. It must be clearly understood, however, that the vast majority of cases do not require this treatment, and that instillations or irrigations in the bladder or urethra are absolutely contraindicated in the acute stages of cystitis, although later on they are of the greatest value.

As the process passes into a chronic condition, the alkaline mixtures can be discontinued, and in their place boric acid, either alone or combined with hyoscyamus or salol may be given; and if the urine shows a distinctively alkaline tendency, urotropin should be given in five to seven grain doses three times a day. This remedy is most valuable in all alkaline conditions of the urine, since it restores the normally acid reaction and induces an inhibitory action on the micro-organisms. When the acute inflammatory symptoms have subsided, it is well to begin the guarded use of gentle and non-irritating bladder irrigations, given by means of a soft-rubber catheter and large hand-syringe; the solutions must be warm, and thrown in slowly and with the utmost gentleness and care, the flow being stopped as soon as the patient experiences the slightest local irritation. Then the catheter should be removed and the patient should be allowed to void the solution, which washes out the entire urethral canal. This treatment, as a rule, is to be given once a day, beginning with normal salt or boric-acid solution,

later mild washings of alum, or alum and zinc in combination; then we may employ permanganate of potassium (1 : 16,000 to 1 : 4000 or even stronger); and finally nitrate of silver solution, beginning with a mild strength, and by degrees working up to 1 : 8000, 1 : 5000, or in certain cases even higher. Thiersch solution, and also solutions of salicylic acid, bichloride of mercury, and many other preparations may be employed, but in the writer's experience they are far inferior to those already given, especially the nitrate of silver, which if conservatively used will be followed by most brilliant results.

When, as a result of the above treatment, the bladder capacity becomes normal and the urine is clear and transparent, but still contains flakes and shreds, instillations (see page 84) of silver nitrate should be substituted for the irrigations. By this time the patient may be sufficiently well to perform his usual duties and may return to regular diet.

If the case is complicated by calculous disease, the stone must be removed by litholapaxy or a cutting operation; when, on the other hand, cystitis is aggravated by urethral stricture, prostatic disease, tumor, or foreign body, these conditions must be treated as already described under these affections. These same remarks apply to cases in which the bladder inflammation is associated with or complicated by a tubercular process.

There are certain rare and exceptional cases of cystitis which resist all forms of local and internal treatment, and require prolonged bladder drainage, either perineal or suprapubic, according to the condition of the prostate and vesical neck; the choice of procedure will then rest with the surgeon after a careful and thorough local examination, which in some cases will be greatly aided by the employment of the cystoscope.

VESICAL CALCULUS.

Vesical calculus originates primarily either in the kidney or in the bladder, and increases in size and weight by the addition, in superimposed layers around the nucleus, of any of the urinary salts, which differ according to the chemical composition of the urine. These salts are held together by a peculiar albuminoid or colloid material furnished by the mucus in diseased conditions of the urinary tract, and without which stone-formation does not occur, even when certain urinary salts are in excessive quantities.

Calculus is, as a rule, single, although many may be found in the same bladder, especially in cases with a deep post-trigonal pouch, in which latter condition their surfaces may be faceted and highly polished. They may be free in the bladder, adherent to its walls, or more or less

PLATE XIV.

FIG. 1.

FIG. 2.

FIG. 3.

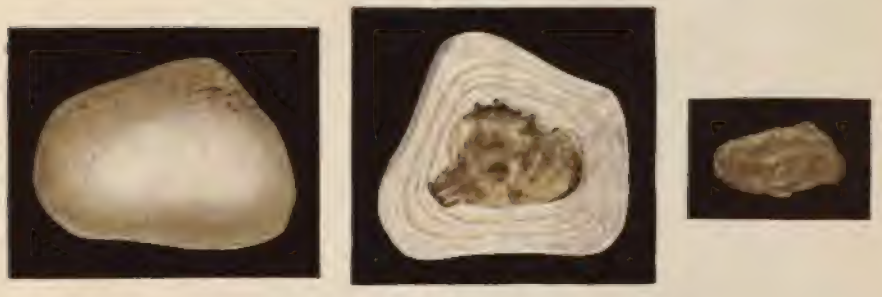


FIG. 4.

FIG. 5.

FIG 6.

VESICAL AND RENAL CALCULI.

Fig. 1. Oxalate of lime calculus (weight, 1200 grains).
Fig. 2. Showing concentric layers of oxalate of lime calculus.
Fig. 3. Phosphatic calculus with nucleus of wax.
Fig. 4. Mixed calculus. Chiefly uric acid.
Figs. 5 and 6. Renal calculi passed through the urethra.

encysted in pouches, diverticula, or sacculi (see Plates VI. and X.); their weight varies from a few grains to many hundred (see Fig. 91), and their shape according to the nucleus and the position they occupy in the viscus. Oxalate of lime calculi (mulberry calculus) are rare, grayish-brown to black in color, the hardest of all in structure, and present a rough and even knobby surface (see Fig. 92 and Plate XIV., Fig. 1). Uric stones, which are composed of uric acid and the urates (see Plate XIV., Fig. 4), have a smooth, yellowish-red surface and are very soft. Phosphatic calculi (see Plate XIV., Fig. 3), made up of phosphates and carbonates, are gray-

FIG. 91.

Very large vesical calculus and phosphatic crusts with chronic cystitis.

ish-white in color, soft and easily crushed, and present a quite smooth or rather roughened surface. These are the usual varieties of stone met with, although cystin, xanthin, cholesterin, and hæmatoidin calculi are rather exceptionally seen. Mixed stones are very commonly encountered, their alternate layers being made up of the various urinary salts, according to the chemical composition of the urine at the time. Stones sometimes undergo spontaneous disintegration or fracture in the bladder. This is supposed to be due to a sudden change in the specific gravity and reaction of the urine, which acts on the mucoid frame-

work and the structure of the different layers of the calculus, and in some way causes its disruption into many fragments.

The vast majority of calculi originate in the kidneys upon uric acid or oxalate of lime nuclei. They usually pass down the ureters into the bladder, either with or without symptoms of renal colic, and escape through the urethra (see Plate XIV., Fig. 5) or remain in the bladder, where they increase in size owing to the deposition of superimposed layers of urinary salts. Many calculi, however, originate in the bladder itself on nuclei, consisting of urinary salts, blood-clots, ropy pus, and foreign bodies, which latter may enter that viscus as a result of accident (bullets, missiles, bits of bone, clothing, ends of catheters and bougies), or are purposely introduced by sexual perverts for sexual gratification (pins, hairpins, bits of straw, shoe-lace, feathers, pencils, pen-holders, wax, etc.—see Plate XIV., Fig. 3). Cases have been reported in which various objects having been swallowed have found their way by ulceration from the intestine to the bladder, where they have become encrusted with urinary salts. Calculi may become encysted in the bladder (see Plate XV.).

Symptoms.—Although the classical symptoms of stone, viz., increased frequency and sudden stoppage of urination, are present in many cases, there are some in which these symptoms are very mild

Fig. 92.

Typical oxalate of lime mulberry calculus.

or practically absent. This is especially true when the stone is smooth and so placed or held that it does not press upon nor irritate the sensitive vesical neck. Patients have been known to carry stones for some time without being aware of their presence, until they were discovered accidentally by the surgeon or on post-mortem examination. When the bladder is full there may be more or less dull aching pain above the symphysis, in the groins, the thighs, testes, urethra, and penis, especially the glans, radiating through the perineum and rectum. This is increased when the patient walks or drives, and is diminished when he

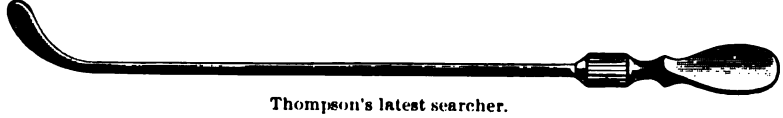
PLATE XV.

ENCYSTED CALCULI OF BLADDER.

lies on his side or back, or assumes the knee-chest position, which rolls the stone away from the sensitive vesical orifice. Some patients suffer from severe reflex pains in the upper or lower extremities, especially along the sole of the foot and in the great toe. As a result of the vesical irritation the penis is sometimes kept in a state of painful erection, which greatly adds to the patient's suffering. At the close of urination the pain may become acute and intense, owing to the stone being forced against the inflamed vesical orifice. This pain radiates through the penis into the glans and causes the patient to press and drag on the organ in the vain hope of relief. At this time there may be violent rectal tenesmus with evacuation of the bowel contents. As above stated, the frequency in the act of urination is increased when the patient is up and about, and decreased when in the recumbent position. In some cases the stream will be suddenly stopped by the stone blocking the vesical orifice, and if the patient changes his position (as he instinctively learns to do) the stone will move away and the flow commences. Hæmaturia, which is caused by the traumatism of the stone against the bladder mucous membrane, is usually slight in amount. It is increased by exercise or anything that causes the calculus to change its position in the bladder cavity. Cystitis, which may be absent or slight at first, soon increases in severity, and thus adds to the patient's suffering and distress.

Diagnosis.—The patient is placed upon his back, with head and shoulders slightly elevated, and then, under local or general anæsthesia, depending upon the irritability of the parts, the bladder floor and walls are gently explored as follows: A clean soft-rubber or woven-silk catheter is passed, the urine drawn, the bladder irrigated with warm salt or boric acid solution, from four to six ounces of which are left in, thus distending the viscus and effacing the vesical folds. A Thompson's searcher (see Fig. 93), either solid or hollow, is passed in

FIG. 93.



Thompson's latest searcher.

a careful manner, with a view of touching the stone, and when encountered a peculiar sensation to practised fingers is conveyed. The click when the searcher strikes the stone can sometimes be heard unless it be coated with blood or muco-pus. The hollow or catheter-like searcher enables the examiner to lessen the amount of fluid in the bladder, which is sometimes an aid in detecting stone and should be remembered, as the sudden emptying of a bladder will sometimes bring the

stone directly against the searcher. Stones sink to the base of the bladder unless they are encapsulated or encysted in its walls. It is well, therefore, to explore this region first, and then the remainder of the cavity. If there is marked prostatic hypertrophy, it may be impossible to touch the stone in a deep post-trigonal pouch, which can sometimes be elevated by raising the patient's hips or by a finger passed into the rectum and pressed upward. If no stone is detected, the horizontal position may be changed to the Trendelenburg, knee-chest, or the side, the idea being to dislodge an impacted calculus. The searcher failing, we may make an ocular examination with the cystoscope, and by its aid we may find the stone if it be present, or obtain data as to the existence of a tumor or a prostatic overgrowth encrusted with urinary salts. Should the stone not be detected, it is well to pass an evacuating tube attached to Bigelow's evacuator, then, when pumping is commenced, a click will be heard or felt from contact of the stone with the instrument. By this procedure a swirl of the bladder contents is produced which dislodges the stone. As a last resort, a small exploratory suprapubic cystotomy may be done, although before resorting to this we may try the Röntgen rays, which sometimes, although not invariably, give a very striking picture. The examination being over, the bladder is carefully irrigated with warm boric-acid or salt solution, some of which is left in, and the urethra flushed as the catheter is withdrawn. The patient then goes to bed or is kept warm and quiet in the house, for it must be remembered that this examination is not devoid of risk, especially in elderly men with more or less damaged urinary organs.

Treatment.—In regard to the preventive treatment of stone formation, either in the kidney or the bladder, very little if anything can be accomplished unless the case is seen at an early date. If a patient has an excess of crystals in the urine, or is passing sand and gravel, their chemical composition must be ascertained and proper means instituted to correct the diathesis, whether it be uric acid, oxalic acid, or phosphatic; the practical point being to render the urine as nearly normal as possible by proper exercise, food and drink, and internal medication: all depending, of course, upon the special requirements of each individual case. The bladder must always be kept sweet and clean, and the residuum reduced and replaced by sterile, non-irritating irrigations.

When stone has formed, however, solvent treatment is of no avail, and the foreign body should be removed by an immediate crushing or cutting operation, the choice of which depends upon the age of the patient, the condition of the bladder and prostate, and the size, consistence, and seat of the stone.

LITHOTRITY, which consists of the crushing of the stone without the

immediate removal of its fragments, is not practised at the present time, having been superseded and replaced by litholapaxy. The technic of the operation is therefore not described.

LITHOLAPAXY.—In this operation the stone is crushed and its fragments evacuated or pumped out at one sitting, the bladder being left free and clean. In practised hands it is the operation of choice for

FIG. 94.

Bigelow's lithotrite, showing slot in heel for escape of detritus.

children and also for adults, unless the patient has a deep post-trigonal pouch with marked prostatic hypertrophy, which renders thorough crushing and evacuation more or less difficult, but not impossible. Again, some stones are too hard or large or inaccessible to be grasped by the lithotrite, and these require in children perineal lithotomy, and in adults the suprapubic route. For the proper performance of litholapaxy, we must have a bladder capable of holding several ounces of

FIG. 95.

Beak of Bigelow's lithotrite (open).

FIG. 96.

Beak of Bigelow's lithotrite (closed).

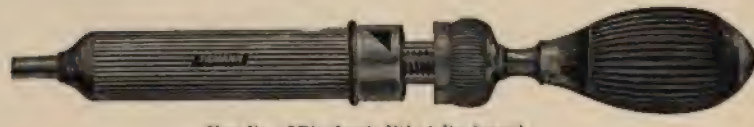
fluid (at least four), and a meatus and urethra that will admit instruments of sufficient calibre for the crushing of large and hard stones; these points should be ascertained at the preliminary examination.

Operation.—The rectum having been thoroughly emptied, the patient is anæsthetized and placed on his back with thighs separated, and the bladder irrigated with boric-acid solution, six to eight ounces of which are left in and retained by tying a tape about the penis, which

can be loosened to allow the passage of instruments. A non-fenestrated Bigelow's lithotrite (see Fig. 94) of proper size (25 F. to 31 F.) is selected, thickly smeared with white vaseline, and passed into the blad-

Fig. 97.

Handle of Bigelow's lithotrite (closed).



Handle of Bigelow's lithotrite (open).

der, its convexity, or heel, being pressed down against the fundus of the bladder and in the median line, where it should be held during the operation. The blades are then separated (see Fig. 95), when the stone will, as a rule, roll between them. They are closed slowly (see Fig. 96),

Fig. 98.

Bigelow's latest evacuator.

locked (see Fig. 97), and gently rotated to see that no vesical mucous membrane has been included; the handle is then slowly turned and the stone crushed. This is repeated until no fragments of the stone can be grasped, when the lithotrite is tightly closed and removed. If the

stone or fragments cannot be seized in this manner, the surgeon will have to rotate carefully or even invert the instrument in his efforts to pick them up, always bearing in mind the fact that they gravitate to the bottom of the bladder. A full-sized straight or curved Bigelow's evacuating tube is plentifully lubricated with white vaseline, passed to the bladder, and held exactly as the lithotrite was; it is then connected with Bigelow's evacuator, which is (see Fig. 98) filled with warm boric acid solution, the two stop-cocks opened, and pumping or squeezing of the rubber bulb commenced, when the finely crushed fragments will be heard to click as they rush along the tube and can be seen dropping into the glass bulb. The pumping is continued until fragments cease appearing. The tube is then removed and the bladder searched, and if fragments are found, crushing and evacuating are continued until the bladder is clean. The bladder is then irrigated and left partially filled with boric-acid or salt solution, which should also flush out the entire urethra.

For very hard and large stones it is sometimes best to do the first crushing with a fenestrated lithotrite, as it cuts through the stone more easily than a non-fenestrated instrument; but it should be remembered that it is also more liable to injure seriously the bladder mucous membrane; the surgeon must therefore exercise the greatest care in the use of this instrument, avoiding nipping and cutting of the bladder walls. If a stone or fragment is lodged or held in a deep post-trigonal pouch, it may sometimes be worked out with the beak of the lithotrite, or by elevating the pouch with a finger, or a rubber bag placed well up in the rectum; elevating the hip or rolling the patient on his side will sometimes accomplish the same result.

Should a fragment become impacted in the eye of the tube, it must always be pushed back into the bladder with a stylet, then crushed and evacuated.

For children we employ lithotrites of about No. 20 F. and even smaller ones, depending upon the size of the urethra; but it is always best to select the largest instrument that will work easily in the canal.

The patient is given an opium suppository and put to bed, where he is kept for a few days and allowed to void his urine naturally. The bladder and urethra are washed daily, and internal medicine given as indicated until the cystitis is cured. Should the operation be followed by complications, such as epididymitis, urinary fever, prostatitis, urethritis, etc., these conditions must be treated as described elsewhere in this work.

Chismore's evacuating lithotrite (see Fig. 99), which, as its name implies, is a crushing and evacuating instrument combined, is sometimes of service in grasping, crushing, and evacuating the last frag-

ment. The shaft of the male blade is hollow, with an aspirating or evacuating bottle attached to its proximal end, while the distal end opens at the heel of the blade, so that, when the blades are separated or opened and aspiration commences, the fragments will be rushed

FIG. 99.

Chismore's evacuating lithotrite.

down between the blades, where they are caught, crushed, and evacuated.

The operator should always have two or three lithotrites, a full assortment of tubes, two evacuators, and a searcher, and also be prepared to do a cutting operation should it prove necessary. There are many varieties of lithotrites, tubes, and evacuators; but as Bigelow's instruments (and for special indications Chismore's) are, in the writer's experience, so much superior, a description of the others is deemed unnecessary, since they are merely modifications of Dr. Bigelow's original instruments.

Perineal Lithotomy.—In children the stone may be removed by the perineal incision, provided litholapaxy is absolutely contraindicated and the surgeon does not deem a suprapubic cystotomy advisable. In adults, however, the perineal route should never be employed, as it is far inferior to either litholapaxy or suprapubic cystotomy, on account of the delicate structures at and around the vesical neck, which may be cut or bruised, either by the knife or forceps, or in the forcible withdrawal of the calculus. Hemorrhage is likely to be severe, and sometimes difficult to control on account of the depth of the wound.

In perineal lithotomy the bladder is reached by a perineal incision, either lateral or median. The technic of the perineal operations is not described in detail, as the author considers them most inadvisable and not to be employed, for the reasons stated above.

Lateral Lithotomy.—The patient being in the lithotomy position, a curved lithotomy staff with lateral groove is passed into the bladder against the stone if possible, and held firmly in the median line by an assistant, who at the same time retracts the scrotum, thus fully exposing the operative field. An incision is then made about one inch in front of and a little to the left of the anus, downward and outward for about

three inches, care being taken not to wound the rectum; as hemorrhage is free, the vessels should be caught and ligated as they are cut, since it is very essential for the surgeon to have a dry wound in this operation. The knife is now thrust into the groove on the staff, which it is made to follow, thus opening the neck of the bladder and cutting into the left lobe of the prostate. The stone is now grasped with the forceps and extracted as carefully and gently as possible, so as to avoid unnecessary bruising of the adjacent structures; the bladder is to be drained and irrigated in the usual manner.

Median Lithotomy.—In this operation the cutting is done on a curved lithotomy staff with a median groove, the membranous urethra opened, and a finger passed into the bladder, in this manner dilating the prostatic urethra, through which the stone is extracted with forceps. The subsequent treatment is the same as that just described in the lateral operation.

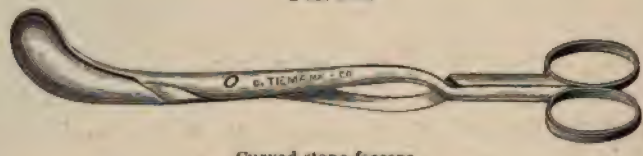
Suprapubic cystotomy, or epicystotomy, is always the operation of choice when litholapaxy cannot be properly employed. By this route we can see and palpate the prostate gland and remove its projecting portions if they encroach upon the vesical orifice; we can also see and remove tumors, or incrustations that are sometimes found on ulcerated surfaces, either in the bladder wall, or upon areas of prostatic overgrowth, or tumor.

OPERATION.—The patient is etherized, placed flat upon the back, with head and shoulders elevated, or in the Trendelenburg position, and a soft catheter passed into the bladder. A collapsed and well-greased rectal bag (colpeurynter) is then placed in the rectum by a trained assistant; the bladder is irrigated with boric acid solution, six to ten ounces of which are retained by tying a tape around the penis. The rectal bag is slowly distended by injecting about six to eight ounces of warm water through its tube, which is then clamped. The rectal bag and bladder can be distended with air, but this method has no practical advantage over fluid.

As the result of the vesical and rectal distention the bladder rises up from the pelvis, thus giving the surgeon plenty of room to incise its anterior wall without wounding the fold of peritoneum that covers this region when the bladder is empty. An incision is now made directly in the median line upward from the top of the symphysis for about three inches, and directly down until the prevesical fat is exposed. This must never be torn or bruised, but rolled gently up and out of the way with the finger-tip. The anterior bladder wall is now exposed, and through it on each side of the median line are passed silk sutures which act nicely as retractors, and between which is made one clean cut with a sharp-pointed knife. As the fluid gushes out of the wound

the stone is carefully caught with straight or curved stone-forceps (see Fig. 100). If the stone is too large to be removed nicely through the

FIG. 100.



Curved stone-forceps.

suprapubic wound, it should be crushed with forceps and taken out piecemeal in a gentle manner, great care being taken not to injure the cut bladder edges and the wound surfaces in general. This step in the operation, if damage is done, will lead to more or less prevesical sloughing and necrosis, with perhaps pus formation. The bladder cavity and prostate are then explored by the aid of artificial light, and abnormal conditions corrected if deemed advisable.

The bladder is washed and drained by means of a large soft-rubber tube with two eyes, and its edges are sewed tightly around the tube, thus preventing escape of urine into the prevesical space. The ends of the wound are closed by deep sutures, but its central portion is left open and lightly packed with strips of sterile gauze, which will prevent leakage or secretion escaping into the prevesical space. In a day or so, a smaller tube is substituted, and as soon as possible all drainage removed and the wound allowed to granulate, which it always will if proper care is exercised by the surgeon. A tight stricture or an abnormally small meatus will for obvious reasons interfere with the proper healing of the wound, and they should therefore receive proper treatment before the operation.

Many elaborate methods for suprapubic drainage are described, but the single tube, connected to a long rubber tube by means of a glass coupler, and terminating beneath the bed in a bottle one-quarter filled with bichloride solution, will meet all the requirements of these cases.

The cystitis which complicates stone is treated in the usual manner by internal and local medication, until the patient passes clear urine in a normal manner.

VESICAL TUMORS.

Bladder tumors are either benign or malignant in character, the former including papillomas, or villous tumors (see Plate XVI.), adenomas, fibromas, cysts, and myxomas; and the latter carcinomas (see Plate XVII.), sarcomas, and mixed tumors. The majority of bladder growths are malignant, a fact which should be borne in mind by the surgeon when making a prognosis and advising a plan of treatment. As a rule, they

PLATE XVI.

VILLOUS TUMORS OF BLADDER.

are situated at the base of the bladder, but may occur on any portion of its walls, to which they are attached either by well-marked pedicles or flattened bases. They may appear at almost any age, but usually are encountered after middle life. Papilloma is the commonest form of benign growth, while carcinoma represents the usual type of malignant disease (see Fig. 101).

Symptoms.—The symptoms of bladder tumor vary greatly, as a result of the situation of the growth and whether it be benign or malignant. A papilloma on the bladder wall may exist for years without the patient's knowledge, whereas, if it was seated on the trigonum or near the vesical orifice, there would be more or less frequency in urination with perhaps hæmaturia and occasional interruption of the stream. Carcinomas and sarcomas usually make their presence known by pain, irritation, and the final development of cystitis. Hemorrhage may be trifling or so free as to exhaust the sufferer, who apparently passes large amounts of bright-red blood. If coagulation occurs in the bladder, the vesical orifice is liable to become occluded with clots, thus causing retention and great suffering. The bleeding may cease for days at a time, and then suddenly occur without apparent cause, and as suddenly stop for a longer or shorter period. The passage of clots

Fig. 101.

Carcinoma of bladder.

and small fragments of tumor by way of the urethra often causes the patient great pain and distress, unless they are expelled without obstruction.

Diagnosis.—The diagnosis of vesical tumor is arrived at by a careful consideration of the history of the case and the condition of the patient, in regard to the pain, frequency in urination, and hemorrhage. A rectal exploration will exclude trouble in the prostate, vesicles, and ampullæ. A microscopic examination of the urine, blood-clots, and especially the small fragments of neoplasm passed by the urethra, will be most valuable in establishing a correct diagnosis. It is therefore desirable to have these patients urinate into a vessel and to save all such masses. If the urine or the injected fluid can be kept fairly clear, either by irrigation of the bladder or the irrigating cystoscope, much valuable aid will be given by a cystoscopic examination of the viscus, which shows the size, situation, and general make-up of the growth, and whether it is pedunculated or sessile, and if it is covered with an incrustation of urinary salts, which latter condition gives a most beautiful cystoscopic picture in the bright illumination of the electric light. In some cases the contact of the beak of the cystoscope will start sudden oozing of blood from the surface of the tumor, while in others the mass can be touched with impunity. If bleeding be so profuse that the cystoscope cannot be employed, the mass can sometimes be felt with a stone-searcher or catheter passed gently over the entire surface of the bladder mucous membrane. Should this method fail and a tumor be suspected, an exploratory suprapubic cystotomy will reveal the true condition. Bimanual palpation is only of aid when the tumor is very large and firm.

Treatment.—Vesical growths should, as a rule, be removed for the following reasons: they are liable to malignant degeneration, to be the cause of serious and even fatal hemorrhage, and they are, as a rule, sooner or later complicated by a cystitis which in time may travel up the ureter and infect the kidney. Should radical operation be out of the question or refused, the surgeon may endeavor to check the hemorrhage with bladder irrigations of hot alum or nitrate of silver solutions, combined with ergot or gallic acid taken by the mouth, the patient being kept in bed and quieted by the guarded use of codeine, opium, or morphine. If there is much tenesmus, with clotting, it is well to drain the bladder by means of a large urethral catheter having one or two good-sized eyes.

Suprapubic cystotomy (see page 385) is always the operation of choice in these cases, as it enables the surgeon to see the entire bladder mucous membrane. The wound should be well retracted, and on slightly elevating the head and shoulders, and thus relaxing the abdominal muscles, a larger working field than is afforded by the Trendelenburg position is obtained. The base of the bladder may be elevated by the rectal bag.

Perineal cystotomy has its advocates, as has also the removal of

tumors by the so-called operating cystoscopes; but, as neither of these methods has any practical advantages, they are not to be commended or employed.

If the tumor has a well-marked pedicle, it should be cut off with long curved scissors at its junction with the bladder wall; if, on the other hand, the tumor is sessile and malignant in character, more or less of the bladder wall must be resected, in order to include if possible all of the infected tissue. In some cases it may be necessary to make a very extensive resection of the bladder, with perhaps transplantation of the ureter. It is always a grave question, however, if such a radical procedure is warranted by the results.

The tumor having been removed and hemorrhage controlled by the Paquelin cautery, hot irrigations, and packing, the bladder is drained by two suprapubic tubes, or one suprapubic and one perineal tube, according to the requirements of the case. The bladder wall is sewed tightly around the drain, but the wound in the soft parts should be left open and drained with strips of sterile gauze, which will absorb any urine or fluid accumulation which tends to escape into the prevesical space. The tubes are removed as soon as possible and the wound allowed to granulate from the bottom. The bladder is kept clean by warm and non-irritating irrigations, and the urine rendered bland by internal medication according to its reaction.

TUBERCULOSIS.

Although vesical tuberculosis may be primary, yet in the vast majority of cases it is secondary to and associated with similar disease in the kidneys, prostate, seminal vesicles, or epididymis, the infecting agent (tubercle bacillus) coming down from the kidney, or passing upward from the prostate gland, seminal vesicle, or epididymis.

Bladder tuberculosis may occur at almost any age, but is most frequently encountered when the sexual organs are active—that is, from about the fifteenth to the twenty-fifth year. In some instances, the sufferer gives a history of masturbation or a previous urethritis, while in others there is no evidence of antecedent irritation of the urinary tract.

Symptoms.—As vesical and prostatic tuberculosis are usually associated with each other, the symptoms are more or less complex, depending upon the advancement of the disease in either one or both organs. As a rule, the first symptom is increased frequency in urination, which may or may not be painful and followed by a little blood. As the infection progresses, the urine, which was at first clear, assumes a cloudy appearance caused by the commencing cystitis, which, as it increases in severity, gives rise to frequent and very painful urination

day and night, each act being followed by painful tenesmus. Hæmaturia, which is marked in some cases, is practically absent in others. The symptoms are really those of a very acute and intense gonorrheal urethrocystitis. As the tubercular process involves the vesical neck, it may cause retention in some cases, and incontinence in others, owing to irritation which it produces.

Diagnosis.—A correct diagnosis can usually be arrived at by a urinary examination for tubercle bacilli, a rectal exploration to ascertain the involvement of the prostate and seminal vesicles, and lastly a cystoscopic inspection of the bladder mucous membrane, which reveals areas and spots of infiltration, granulation, sometimes of ecchymosis,

Fig. 102.

Tuberculosis of the bladder.

and later of ulceration, which is usually annular in form (see Fig. 102). The ulcers may be single or multiple, may have thickened and undermined edges, and may be superficial, or so deep as to lead to perforation. The bladder walls are more or less thickened and roughened,

and the capacity of the viscus is diminished. The patient's history, both personal and family, must be taken into consideration. All instrumental examinations in these cases must be conducted with the utmost care and gentleness, since traumatism of any kind is very apt to be followed by an acute exacerbation of the disease. Cystoscopy and sounding should therefore never be employed unless absolutely essential.

Treatment.—These patients should, if possible, be removed to a suitable climate, and receive the usual constitutional treatment indicated for tubercular subjects. By internal medication we should try to render the urine as bland, aseptic, and non-irritating as possible. In regard to the local treatment of these cases by bladder irrigations or surgical intervention, there is a great diversity of opinion, the majority being in favor of trusting to climatic change and constitutional treatment until conditions arise that demand temporary surgical relief, as, for example, suprapubic drainage when tenesmus becomes constant and unbearably painful, rather than to undertake any radical operation with a view of eliminating a disease which has already attacked the surrounding structures and cannot therefore be wholly eliminated by the knife. As the patient's suffering increases opium must be employed in a careful and intelligent manner, always bearing in mind that it may have to be used for a long time. Among bladder irrigations, iodoform in emulsion, and bichloride of mercury in watery solution, hold first place, but must not be employed without due thought and consideration. The local treatment will be indicated by the character of the urine, the stage of disease, and the involvement of adjacent organs.

CYSTOSCOPY.

The illumination of the bladder and its visual examination by means of the electric cystoscope is undoubtedly of the greatest value in diagnosticating certain diseased conditions of that viscus and also of the kidney, but it must not be used in a routine and haphazard manner, nor employed until we have endeavored to make the diagnosis by the usual methods. Then, the case demanding it, cystoscopy should be practised.

The patient is placed on his back with knees flexed and widely separated, and then under local or general anæsthesia a suitable cystoscope (see Fig. 103), and one to which the surgeon is accustomed, anointed with glycerin, is passed into the bladder, the electric current turned on, and the surgeon, sitting on a low stool, examines every portion of the vesical mucous membrane and the orifices of the ureters, from which either the urine, blood, or pus can be seen to escape every few seconds. Tumors, projecting prostatic overgrowths, stones, foreign bodies, ulcerations, trabeculæ, diverticula, etc., can be seen and studied by the practised eye; but the cystoscopic picture will be very confused and in-

definite to the beginner, who should first acquaint himself with the condition of the normal bladder before he tries to study pathological conditions. For a satisfactory examination, the following conditions are necessary: a urethra that will admit at least a No. 22 French, a bladder containing from four to six ounces of clear urine, or the same amount

Fig. 103.

Leiter's cystoscope.

of a clear solution, or a solution that can be kept clear by means of the irrigating cystoscope (see Fig. 103). The examiner, and especially the beginner, must always bear in mind the above practical points, and not undertake a cystoscopic examination in a contracted bladder whose contents are rendered opaque by the admixture of pus or blood arising from either kidney, bladder, or prostate. (See Plate XVIII.)

VARIOUS STRUCTURAL CONDITIONS.

The bladder may be absent in part or in its totality, the ureters opening into the rectum, vagina, urethra, or other abnormal localities. In fact, this viscus may be malformed or malplaced in a great variety of

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Explanation of Plate XVIII. (After Nitze.)

Fig. 1 represents the mucous membrane and the arrangement of the vessels in the healthy bladder.

Fig. 2 represents a condition which is very frequently found and is almost typical; both lateral lobes are hypertrophic and form large symmetrical prominences encroaching upon the interior of the bladder; the internal orifice is situated between them. At the point of the angle a small piece of mucus is seen adherent.

Fig. 3. Phosphatic concretion from a patient suffering from prostatic disease; to the right a part of the hypertrophic fold of the internal orifice is seen.

Fig. 4. Showing a uric acid calculus and in the upper part of the figure the furrowed mucous membrane of the floor of the bladder.

Fig. 5. Showing villous tumor of the bladder.

Fig. 6. Recent miliary tubercles from the bladder of a patient, aged forty-three, forming groups of small globular nodules arranged very much like vesicles in herpes. They are sufficiently distinguished from the otherwise healthy mucous membrane by their dull-pink color.

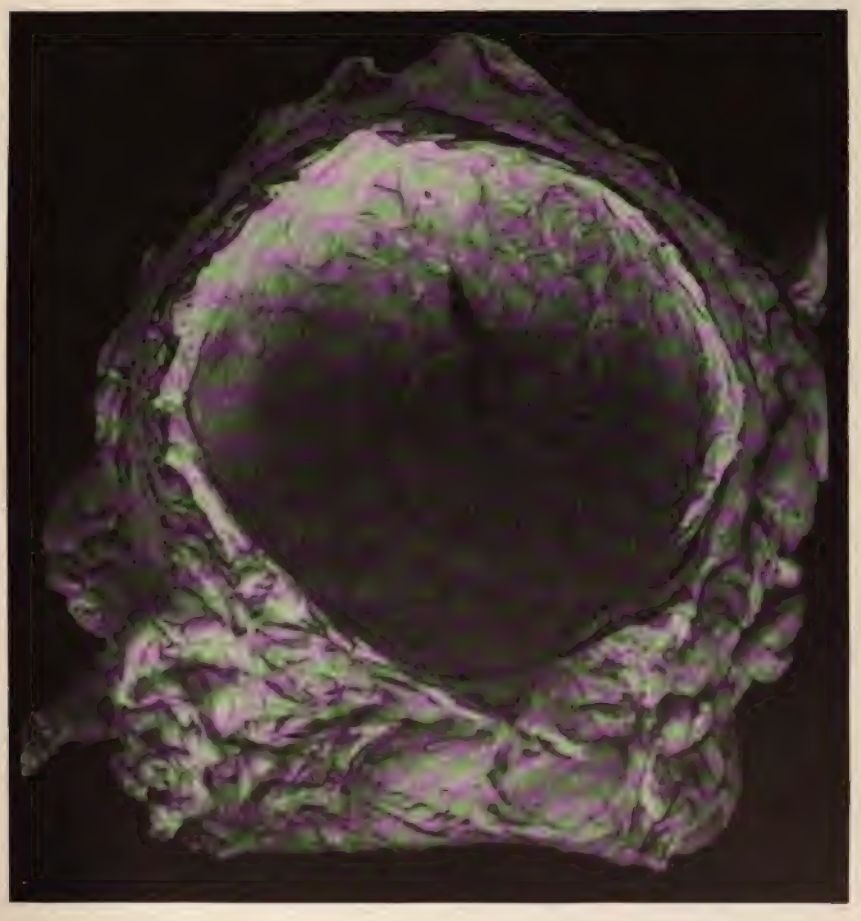
PLATE XVIII.

APPEARANCES REVEALED BY THE CYSTOSCOPE.

PLATE XIX.

EXTENSIVE RUPTURE OF BLADDER,
showing peritoneal surface.

PLATE XX.



RUPTURE OF BLADDER,
from within.

ways, but it must be remembered that these conditions are extremely rare.

Exstrophy.

Exstrophy, or extroversion of the bladder (ectopia vesicæ), is due to lack of, or insufficient development of, the anterior abdominal walls and the symphysis pubis; the anterior wall of the bladder, the posterior wall with the ureters is pushed forward and bulge out of the abdominal opening. In these the urine trickles out over the surrounding integument, and it becomes reddened and excoriated. The patch or piece of bladder mucous membrane is usually intensely congested, sodden, and bleeds readily on manipulation. The testes may be present in the scrotum or they may be retained. In some cases there is a complicating hernia. The deformity is more common in the male, in whom it is usually associated with epispadias.

Treatment.—The object to be attained in the treatment of these cases is the collection and removal of the urine without irritating the integument and soiling the clothing. This can be more or less perfectly accomplished by the use of a suitable urinal, which should be worn day and night, or a plastic operation may be performed, either with or without transplantation of the ureters. If the cleft is very wide, a flap of the integument from the abdominal wall (Wood's operation) can be utilized to form a new anterior bladder wall. In this event the hair-follicles should be previously destroyed, since the presence of hairs would naturally favor the development of stone, and thus add to the patient's distress. If, however, the cleft is not too broad, the best results follow suturing of the edges or borders of the bladder wall together, as this gives us a viscus which, although very small, is lined with mucous membrane and it can be fitted with an apparatus which collects the urine from an opening in its most dependent part.

TRAUMATISMS.

The bladder may be punctured, incised, torn, or contused, as a result of gunshot-wounds, stab-wounds, fracture of the pelvis, and general injuries. These accidents are much more liable to occur when that viscus is distended and elevated than when it is empty, contracted, and deeply seated in the pelvis behind the symphysis.

Rupture of the Bladder.

A distended bladder, the result either of violence or of pathological changes (weakness) in its walls, may rupture; the rent being more frequently intraperitoneal than extraperitoneal. (See Plates XIX. and XX.)

Symptoms.—If the patient is not intoxicated at the time of the

accident (and he very frequently is), he complains of a sudden pain, or as if something had "broken" or "given away" in the suprapubic region. This is quickly followed by a constant and imperative desire to urinate, which when attempted is fruitless. The patient passes blood and a little urine, or nothing at all, but each act is followed by severe tenesmus. If the nature of the injury is not recognized and proper treatment employed, the patient's condition grows gradually worse until he passes into a state of shock, and finally succumbs from septic peritonitis or pelvic cellulitis, as the urine in these cases is, as a rule, not normal (sterile). If, on the other hand, the treatment is prompt and efficient, the patient's chances are much better; but the prognosis is always grave, especially in intraperitoneal cases with entrance of septic urine into the peritoneal cavity.

Diagnosis.—The previous history and present condition having been carefully considered, the abdomen is palpated and the rectum examined. The former procedure will aid us in extraperitoneal rupture, and the latter in the intraperitoneal variety, when there will be more or less tumefaction in Douglas's cul-de-sac and the adjacent tissues. The bladder walls can then be examined with the aid of a gum-elastic or silver catheter, which if the eye is not occluded with a clot may allow of the escape of blood or bloody urine. It may happen that the point of the catheter may catch in a rent or tear, or even pass through it. Through this catheter a known quantity of warm sterile salt solution can be gently injected, and if the same amount is not withdrawn, the missing quantity must have escaped into the surrounding tissues or peritoneal cavity. This test is not to be relied upon absolutely, as the catheter may become plugged with clots, the tear may be so made that the bladder will hold fluid unless great force is used, or the wound may have been closed quickly by plastic exudation. Cystoscopy is, as a rule, of little aid on account of the hemorrhage. The above methods having failed to establish a correct diagnosis, the patient is etherized and an exploratory suprapubic cystotomy performed (see page 385), when the surgeon can make a visual examination of the bladder surface, and locate the injury.

Treatment.—When the rent in the bladder wall is extraperitoneal, it may be closed and the patient catheterized continuously; or, better still, it may be left open and drained by the ordinary suprapubic method; the prevesical space being lightly packed with gauze, which prevents infiltration into the surrounding tissues. Thorough cleansing and drainage of the prevesical space are most important; therefore the surgeon should always be on the lookout for signs of burrowing or suppuration in this and the perineal region. If, however, the rent is intraperitoneal, laparotomy should be performed and the tear in the

bladder wall should be tightly closed by several interrupted sutures, so as to prevent further leakage of urine into the peritoneal cavity. Existing conditions are treated according to general surgical principles, and the abdominal wound closed, except at its lower portion, which should be left open and drained with strips of gauze. The bladder is to be drained for a few days by means of a permanent urethral catheter or perineal tube, through either of which it should also be gently irrigated.

FOREIGN BODIES.

Foreign bodies gain access to the bladder either by way of the urethra or through its walls as a result of injury or ulceration. Sexual perverts not infrequently introduce hair-pins, pieces of shoe-lace, straw, pencils, pen-holders, long pieces of wax, and, in fact, all kinds and varieties of articles, with the view of gratifying their abnormal sexual cravings. The ends of catheters, bougies, etc., may break off in the bladder, and therefore the surgeon should always see that these instruments are in good condition before introducing them. As a result of injury, bullets, missiles, bits of shell and bone, clothing, etc., may enter the bladder. Solid articles swallowed accidentally by patients have been known to pass from the intestine to the bladder by ulceration of their walls.

The **symptoms**, which may be absent or trifling at first, soon become marked, as the foreign body is rapidly incrusted with urinary salts, causing the usual symptoms of stone.

The **diagnosis** is readily made from the history of the case and the symptoms, followed by exploration of the bladder with a stone-searcher, and the electric cystoscope if the surgeon cares to see the shape and conformation of the foreign body, since this information will aid him greatly in the choice of operation.

Treatment.—If the object is small and soft or brittle, it may be caught with a lithotrite and removed, or crushed and evacuated as in litholapaxy. If, however, this plan of treatment is contraindicated, the bladder can be opened either by a small suprapubic or by a perineal incision. Special instruments for the removal of foreign bodies have no advantages whatever over the above method, and are therefore not described.

CHAPTER XIX.

AFFECTIONS OF THE URETERS.

THE ureters may be double, multiple, or absent; they may pursue an abnormal course, emerging from any part of the kidney other than its inner border, and terminate extravesically. Their calibre may be diminished or occluded by stone, stricture, or valve-like folds. They may be the seat of tumors, fistulæ, or tuberculous disease.

THE SHAPE OF THE URETER.

The ureter is not a uniform-calibred tube, but consists of ureteral dilatations and constrictions. Calculi lodge at the ureteral isthmuses or constrictions, as well as at the turns of flexions. The following facts are taken from Byron Robinson's essay on the shape of the ureter (see Fig. 104):

Fig. 1 illustrates the shape of ten ureters distended with paraffin, demonstrating (*a*) the three ureteral dilatations, spindles (reservoirs) (2, 4, 6); (*b*) the three constrictions, sphincters (3, 5, 7), and (*c*). The spirality was noted while distending the ureters with melted paraffin. The free ureter would rotate from right to left about two circles.

Nos. 1 (left) and 2 (right); man, aged forty-six years. This pair show the left calcyces (1, 1) dilated and a well-developed pelvis (2). The left proximal ureteral isthmus (3) well marked and distalward located; the right (3) indistinct and elongated, less constricted. The left lumbar spindle (4) the most prominently developed and the more distalward located. The middle isthmuses (5, 5) moderately marked. In each ureter two pelvic spindles (6, 6) exist. The distal isthmuses (7, 7) were less in lumen than the proximal (3, 3).

The left ureter (1) presented five well-marked spinal ridges projecting in the ureteral lumen. All ureteral dilatations are more prominent in the left. The left ureter (1) was one inch longer than the right (2).

The left ureter (1) is complete—*i. e.*, it presents four calyces (1, 1), pelvis (2), ureter proper, and the renal artery lying on the ventral surface of the calyces and pelvis. The calyces and pelvis were the result of corrosion process. Nos. 3 (left) and 4 (right), woman. This pair shows well-marked right calyces (1, 1), well-developed oval pelvis (2), and distinctly marked right narrow proximal isthmus (3). Promi-

nent right lumbar spindle (4). The right middle isthmus (5) should be placed on a level with the left middle isthmus (5).

Two pelvic spindles exist in each ureter (6, 6). The right lumbar spindle is generally larger in woman than man. The distal isthmuses (7, 7) were larger in calibre than the right proximal (3).

FIG. 104.

The form of the ureter. (From Byron Robinson.)

No. 5 (left), lumbar spindle (4) and two short pelvic spindles (6, 6). No. 6 (right) shows short narrow proximal isthmus (3). Two large and one small lumbar spindle (4), narrow middle isthmus (5), a short, well-marked pelvic spindle (6). Nos. 7 (left) and 8 (right), man, aged forty-six years. This pair shows moderately developed calyces (1, 1), double-armed, slightly developed, rounded pelvis (2, 2). Marked, but

distally located proximal isthmuses (3, 3). Short, but marked, lumbar spindles (4, 4). Moderately marked middle isthmus (5, 5). Two unequally sized pelvic spindles on each side (6, 6). Distal isthmuses (7, 7) about equal in lumen to the proximal (3, 3). Nos. 9 (left) and 10 (right), woman, aged forty-nine years. This pair shows moderately developed flattened right pelvis (2). Indistinct, elongated, proximal, ureteral isthmuses (3, 3). Slightly developed left lumbar spindle (4), but more marked right one (10). The middle isthmus is but slightly marked on left (5), on the right more marked. The right (10) shows two large and one small pelvic spindle (6, 6). The left ureter (9) shows one pelvic spindle (6°). The distal isthmuses (7, 7) are less in calibre than the proximal.

TRAUMATISMS.

The ureters are sometimes injured as the result of gunshot- or stab-wounds, or general injuries; or during surgical operations they may be partially or completely severed.

Treatment.—If a diagnosis can be made (and this is usually a difficult task unless the ureter is injured, at the time of an operation), the opening in the tube may be closed by suture. If, on the other hand, the tube is more or less completely severed, its continuity can be restored by anastomosis (van Hook's operation), the ureter being approached and exposed either extraperitoneally or intraperitoneally, according to the cause of the injury and the location of the wound.

URETERITIS.

This condition may be caused by the direct upward extension of disease from the bladder, or downward from the kidney (cystitis, tuberculosis, pyelitis), but is so obscured by the bladder or kidney symptoms that its existence is rarely recognized and its treatment is, as a rule, a matter of speculation.

STRICTURE OF THE URETER.

This condition has been diagnosticated and treated by means of ureteral catheters and bougies passed from below upward through the ureteral orifice or through an incision into the continuity of the tube.

STONE IN THE URETER.

It sometimes happens that a renal calculus becomes impacted in the ureter; but, as a rule, after a sharp attack of kidney colic the stone enters the bladder, where it remains and enlarges, or is passed by the urethra (see Fig. 105). The diagnosis is to be made from the history of the acute onset of kidney colic, followed by hydronephrosis or pyo-

nephrosis due to the blocking of the ureter (see Fig. 105). Catheterization and even exploration of the ureters may be justifiable in some

Fig. 105.

Calculi impacted in an ureter with hydronephrosis

cases. Abdominal palpation and rectal examination will be of aid, as will also a quantitative and qualitative examination of the urine.

Treatment.—The patient should be put in a hot sitz-bath, given rectal injections of hot saline solution, and enough morphine hypodermically to relieve pain. If urination be impossible and the bl

distended, these conditions must be relieved by aseptic and gentle catheterization.

When, after a fair trial, palliative treatment fails and the calculus becomes permanently lodged in the ureter, then, and only then, is it time to think of operative relief. The ureter is exposed by a lumbar incision, the stone located and removed through a longitudinal cut, which can be left open or closed according to the preference of the surgeon, and the wound should be treated on general surgical principles, every endeavor being made to prevent ureteral fistulæ.

DIAGNOSIS OF KIDNEY CONDITIONS AND LESIONS WITHOUT CATHETERIZATION OF THE URETERS.

Voelcker and Joseph have found that indigocarmine is excreted by the kidneys with sufficient regularity and promptness to make it a reliable indicator of the functional efficiency of the two organs. The difficulties of ureteral catheterization and the uncertainty of cryoscopy, which is the determination of the necessary freezing-point of the blood and urine, have made these newer functional aids in diagnosis of renal lesions more theoretical than practical. The author's method accomplishes the same purposes in a much simpler and reliable manner. Indigocarmine has many advantages over methylene-blue, which has previously been employed in renal work. It is non-toxic, is excreted only by the kidney, and does not suffer change in its passage through the body. Its appearance in the urine is noted within a very short time after its administration, reaches a maximum in thirty minutes, and the coloration disappears within ten hours. The authors inject into the gluteal muscles 4 c.c. of a warm sterile 4 per cent. solution of indigocarmine in physiological salt solution. On introducing the cystoscope the urine is seen to leave the ureteral openings in jets of blue-colored fluid, which gradually disperse like puffs of smoke. Not only is the finding of the ureteral orifices greatly facilitated, but it is possible to determine positively the existence of two secreting kidneys, and to estimate the actual amount of functionating tissue in each kidney, and the relative proportion of the work done by each as indicated by the comparative size, frequency, and force of the two streams. The method has been used successfully in a number of cases in which the results were controlled by operation or autopsy and its value demonstrated.

CATHETERIZATION OF THE URETERS.

By means of any of the various ureter or catheterizing cystoscopes now on the market (see Figs. 106 and 107) a skilful operator is often enabled to locate the ureters and pass a delicate catheter into their

interior, from which will flow the normal or morbid secretion from either one or both kidneys.

FIG. 107.

Brenner's ureter cystoscope.

FIG. 106.

Caspar's ureter cystoscope.

In the Brenner cystoscope the catheter emerges from the convex side of the instrument, while in the Albarran Caspar and Nitze instruments the catheter is situated on its upper or concave side. The choice of an instrument depends upon the requirements of the case and the skill and experience of the surgeon in this special field of work.

The technique of the operation is practically the same as for simple cystoscopy (see page 391). The ureters being found, first one and then the other is catheterized with a woven-silk catheter of about No. 5 French scale under the direct vision of the operator. The eye of the catheter having entered the ureter, the stylet is withdrawn. Simple as this seems, it is often a very difficult and sometimes impossible task, especially in hypertrophied conditions of the prostate and in an irritable and contracted bladder. In this manner it is possible to determine whether blood, pus, or tubercular material escapes from the right or left kidney, and also if one or both are functionating normally; and whether both kidneys are present (and this is a most important question when nephrectomy or nephrotomy is contemplated). Blocking of the ureter from the stoppage of a renal stone or from a structural condition can also be determined with more or less accuracy. Catheterization of the ureters is at best a very delicate procedure, not devoid of danger, and should only be employed when all other methods of examination have been exhausted, and by one who is competent to do such work. It must be remembered that the little catheter may cause more or less (sometimes quite severe, as is shown by bleeding) traumatism of the ureteral orifice and the ureter itself, thus a suitable soil

Fig. 108.

Harris segregator

for infection may be produced, the seeds of which are already present in the diseased bladder, ureter, or kidney.

Kelly's dry method of catheterizing the ureters is omitted, as being especially applicable to the female and as not having had as yet a suffi-

cient trial in male subjects, in whom, in all probability, it will not prove of much value on account of the length of the urethra.

The Harris segregator (see Fig. 108), for collecting the urines without catheterizing the ureters, may prove of great value in certain cases, but our experience with it is too meagre to warrant positive conclusions. Its introduction and retention cause considerable pain and uneasiness: therefore great care has to be exercised that traumatism to the bladder and adjacent structures is not produced.

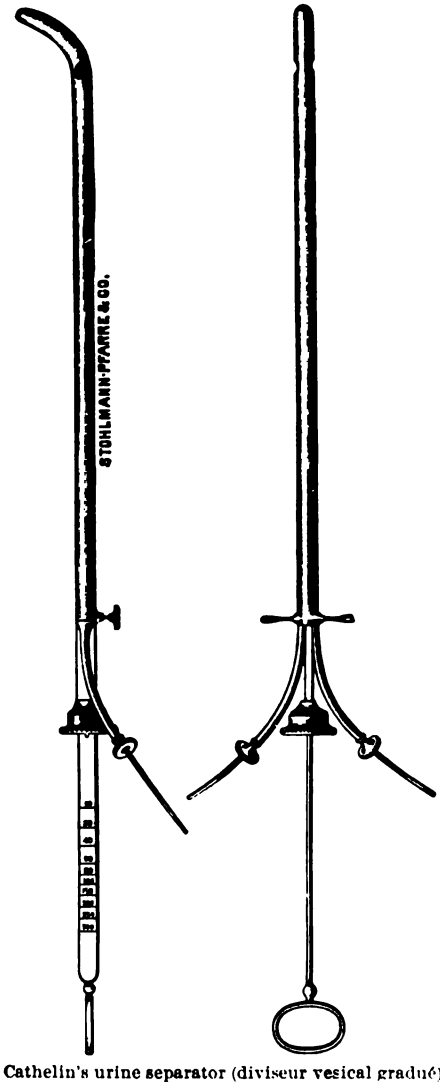
The latest procedure for collecting the urine separately from the two uterers is advocated by Cathelin, of Paris, and has been indorsed by many surgeons.

Cathelin's urine separator (diviseur vesical gradue) is an extremely simple instrument, and one that can be used by almost any operator and requires but little technical knowledge. It has been well described and endorsed by Vanderpoel. It consists of a hollow tube in the shape of a lithotrite, corresponding to No. 25 French. In the centre of this tube is a flat piston, to the end of which is attached a membrane which separates the bladder into two lateral chambers. Upon the sides of the tube are two openings, into which, and through which, pass two ureteral catheters. The manipulation of the instrument is as follows: The sterilization, in the first place, can be done by ordinary boiling of everything except the gum silk catheters, which are sterilized by formaldehyde. After sterilization one of the catheters should be passed through the canal at the side until it comes to the opening at the other end; the same should be done with that of the opposite side. The second step is the injection of a few drops of liquid through the catheters to determine their permeability. Next attach the membrane or diaphragm to the distal end of the instrument, where it fits into a catch on the end of the piston, and is fastened by means of a little tack, held in place by a spring. The membrane being attached and in position, it should be oiled with sterilized oil or lubrichondrin, and then the piston withdrawn until it (the membrane) disappears within the shaft.

The preparation of the patient is the same as for any cystoscopic examination—that is, the bladder is washed out with one of the various aseptic solutions at our disposal, after which it is necessary to determine the capacity of the bladder (that is, not its greatest capacity, but the point where the patient first desires to micturate). The instrument has been used by Cathelin on a patient who had a capacity of about 18 grammes, and was kept *in situ* for fourteen minutes. This is the smallest bladder on record which has thus been treated. The instrument can be used in almost any sized bladder, but in extremely large or sacculated ones it might not be applicable. After determining the

capacity of the bladder, inject 10 c.c. of sterile fluid, in order afterward to start siphonage. The instrument is then passed and the catheters introduced—*i. e.*, protruded at the distal end into the sides and lower part of the bladder. The distance which they should be introduced de-

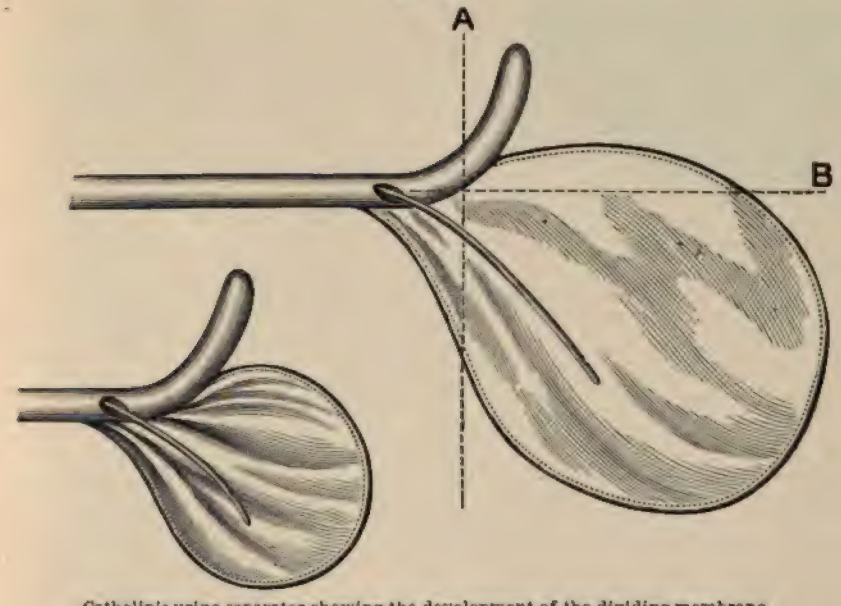
FIG. 109.



Cathelin's urine separator (diviseur vesical gradué).

pends upon the capacity of the bladder. If it is one of 100 grammes, they should project 2 cm.; if 200 grammes, 4 cm.; if 300 grammes, 6 cm., which distance can be measured by markings on their proximal end. After introduction, the beak of the instrument is brought back snugly

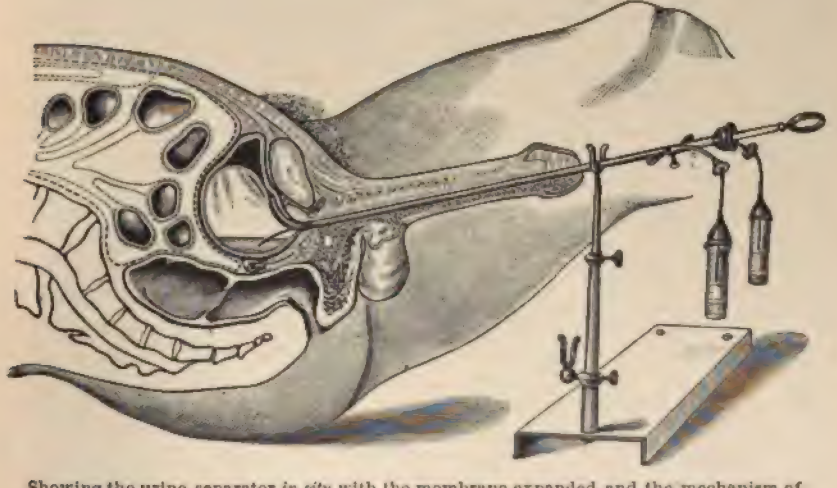
FIG. 110.



Cathelin's urine separator showing the development of the dividing membrane.

against the symphysis pubis, which brings the inferior portion with part of the membrane into the posterior urethra, so that part of the membrane lies

FIG. 111.



Showing the urine separator *in situ* with the membrane expanded and the mechanism of collecting the urine from the two ureters.

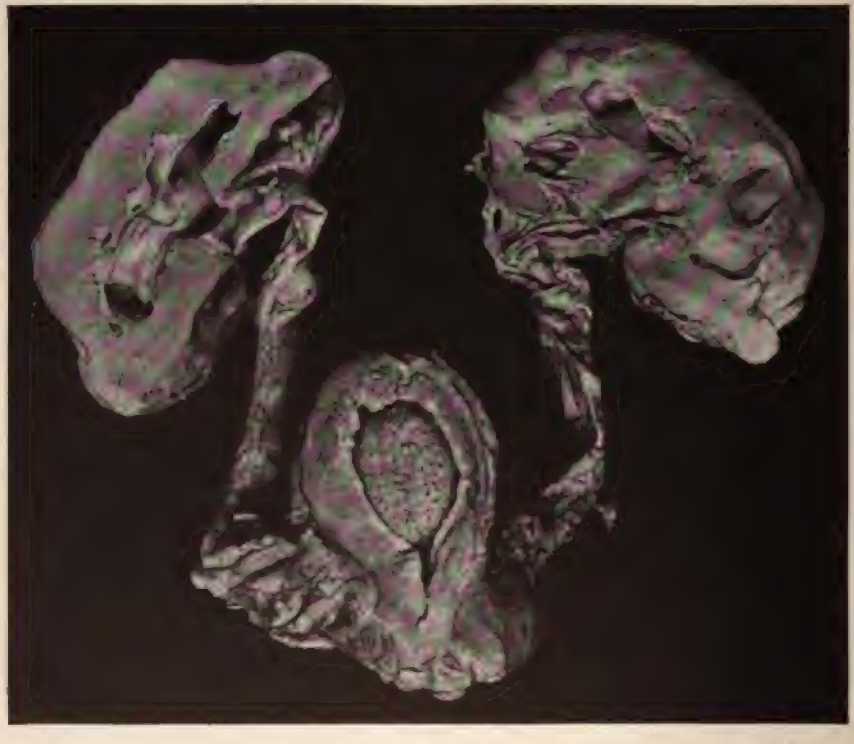
in and divides the posterior urethra as it does the bladder. After it is drawn against the symphysis pubis, protrude the membrane corresponding to the number of grammes which the bladder will hold, which

is marked upon the proximal end of the piston. The instrument is then brought upward slightly, not being left exactly in a horizontal position, so that the membrane will fit better into the bladder floor. The edge of the membrane is composed of a thin wire, which prevents it from collapsing. The fluid which has been injected will then begin to flow easily and rapidly; but if the streams do not start immediately, it is a very simple matter to inject a few drops at the end of each catheter, to start the flow. The usual sitting is not over thirty minutes, allowing eight to ten minutes for getting in working order. The urines are then collected into the glasses or tubes, the outer one of the instrument being held firm and resting on a stand consisting of the lid of the box, into which is secured a sliding rod for male or female patients. The patient is prone upon the table, with head slightly raised and thighs separated. There is no pushing up (as in the segregator) of the wall of the rectum, and no forming of a partition in the bladder, except by the membrane which is introduced. The removal is simple. First withdraw the catheters, and then the membrane, after which release the instrument as one does a steel sound.

PLATE XXI.

ASCENDING PYELONEPHRITIS, CYSTITIS, AND HYPERTROPHY OF THE PROSTATE.

PLATE XXII.



ASCENDING PYELONEPHRITIS AND ABSCESS OF KIDNEY; ENORMOUS VESICAL CALCULUS AND CYSTITIS.

CHAPTER XX.

AFFECTIONS OF THE KIDNEY.

SUPPURATIVE INFLAMMATIONS OF THE KIDNEY.

THE suppurative inflammations of the kidney may be classed under the following heads: pyelitis, pyelonephritis, pyonephrosis, suppurative nephritis, and perinephritis.

Pyelitis and Pyelonephritis.

Pyelitis is a condition resulting from inflammation of the pelvis of the kidney and of its calyces, and is usually accompanied by dilatation of these cavities. It should be clearly borne in mind that in only a few of the cases under consideration is there, strictly speaking, the definite morbid entity which we call pyelitis. In some cases of temporary irritation and inflammation of the tissues of the pelvis and the calyces from local and general causes these structures alone are involved; but in the great majority of cases the morbid process extends beyond the pelvic region and invades the parenchyma of the kidney proper in various degrees of extent and intensity. In nearly all cases, therefore, in which the causes and conditions now to be mentioned result in disease of the pelvis of the kidney, there are morbid changes in the renal parenchyma, the simplest forms of which are acute and chronic hyperæmia and congestion (which may or may not be of ephemeral duration), and the severe ones are the various infiltrative and degenerative changes now to be mentioned. In all forms of pyelitis and pyelonephritis it is very probable that morbid disturbances of a congestive nature are the predisposing causes which underlie the conditions of susceptibility to the inflammation. The usual exciting causes are germ infections. Tissue-peculiarities seem to render some individuals more susceptible than others.

Etiology.—Pyelitis and pyelonephritis may be due to extension of the morbid inflammatory process from the bladder through the ureters (which are also, as a rule, involved), as a result of stricture of the urethra, hypertrophy of the prostate, the various forms of cystitis, and of atony and paralysis of the bladder. This is called ascending pyelitis and pyelonephritis, and is the most common form of the affection. (See Plates XXI. and XXII.)

Ascending pyelitis and pyelonephritis may also result from obstruction of a ureter by a calculus. Cases have recently been reported

in which pressure upon the ureter by a tumor or an enlarged uterus produced suppuration in the kidney, probably from infection from the intestinal canal. Recent observations prove that in exceptional instances gonorrhœal inflammation may attack the bladder, travel up the ureters, and involve both the pelvis and the kidney. In some cases the infecting agent is the gonococcus, but in other cases a mixed infection is the cause of the trouble.

This condition may be unilateral or both kidneys may be attacked.

Descending pyelitis and pyelonephritis are that form in which microbic infection seems to be the predominant element, and which is carried to the kidneys by means of the arterial supply and the veins, and probably by the lymphatics.

These cases are caused by various acute and chronic infectious diseases, such as osteomyelitis, caries of bones, diphtheria, typhoid fever, appendicitis, pyæmia, puerperal septicæmia, perityphlitis, and lesions of the intestinal canal, liver, and spleen. In most cases these conditions primarily produce nephritis, and the resulting pyelitis is due to extension of the morbid process by contiguity of tissue with the infecting foci. It is, therefore, in such instances a secondary pyelitis. But in some cases there has been found an antecedent pyelitis due to local lesions, and in that event general infective processes have produced an intense form of the pelvic inflammation.

Descending pyelitis and pyelonephritis may therefore be of the simple catarrhal or the suppurative type.

The third and strictly local form of pyelitis and pyelonephritis is that caused by the lodgement of sand, gravel, and calculi (uric acid, oxalate of lime, phosphates, cystin, and xanthin), and is called calculous pyelitis and pyelonephritis and nephrolithiasis, and is due either to irritation of the pelvic tissue itself or to obstruction of the ureter. This condition is more frequent in men than in women. In some cases of highly acid urine with excess of uric acid crystals and of oxalate of lime, a superficial pyelitis may be produced which ceases when the irritating cause is removed; or, if the latter is persistent, the pelvic inflammation may become severe and chronic, and then the renal parenchyma may also be attacked. Renal calculi may be small, and for long periods may remain in the pelvis and cause no symptoms. In many cases they lodge in the ureter, and, if not too large, after giving rise to considerable pain, may pass into the bladder. In some cases they become impacted in the ureter and cause hydronephrosis or pyonephrosis. In exceptional cases, when these conditions are unilateral and the other kidney is diseased, and when both organs are thus affected, death usually results from uræmia, unless operative intervention affords relief. When the renal calculus remains and increases in size, there

PLATE XXIII.

PYELONEPHRITIS, PERINEPHRITIC ABSCESS, AND CALCULI OF KIDNEY.

may be mild pyelitis, and severe nephritis or intense pyelonephritis may be produced. (See Plate XXIII.)

Pyelitis and pyelonephritis may result from traumatisms of the kidney which produce perinephritis. In this event the morbid secretions burrow and rupture into the pelvis of the organ or into the renal parenchyma. In like manner foreign bodies, such as fragments of bone, benign and malignant neoplasms, or parasitic growths near the kidney, may lead to suppurative degeneration and of the pelvic and renal parenchyma. These same conditions may occur around or near the ureter, which then becomes blocked, and, as a result, a form of ascending pyelonephritis is produced. This fourth form of pyelonephritis really belongs in the category of traumatisms.

The fifth form of pyelitis, and perhaps pyelonephritis, are usually of a mild catarrhal character, and are caused by the elimination through the kidneys of such drugs as creasote, chloroform, carbolic acid, cantharides, turpentine, copaiba, cubebs, and santalwood oil, which have been taken into the stomach. In these cases there may be a concomitant congestive nephritis. With cessation of the irritating cause the kidney lesions soon undergo resolution.

Tuberculosis is a rather infrequent cause of pyelitis and pyelonephritis, and, while it may arise primarily in the kidney, it is very often coexistent with and perhaps an extension of the same process in the ureters, bladder, prostate, seminal vesicles, testicles, ovaries, and uterus. This morbid process usually begins in the mucous membrane of the pelvis and calyces, and thence extends to the stroma of the organs. As a result, the tissues are degenerated and replaced by pulpy masses, which become cheesy and calcified, and also may develop into fibrous tissue. In this way the whole organ may be destroyed.

Tubercular nephritis and pyelonephritis may be unilateral and complicated with a similar process in the urinary tract of the same side. Extension of the infiltration may lead to peritonitis and pulmonary tuberculosis.

Renal tuberculosis usually occurs about puberty, but may manifest itself beyond the fiftieth year, and is more frequent in the male than the female.

There is also an ascending and usually bilateral form of tubercular pyelonephritis which is due to extension from the prostate, testes, seminal vesicles, bladder, and ureters. The descending form, which may be unilateral, is due to infection carried through the bloodvessels from foci in various organs of the body. Primary renal tuberculosis is rare, but instances have been observed.

In tubercular nephritis and pyelonephritis the morbid process may extend through the capsule and attack the surrounding fatty and con-

nective tissues. This tubercular perinephritis may also be caused by the bursting of infected cysts seated in the renal parenchyma.

Pathology of Pyelitis.—The pelvis and calyces become dilated, their mucous membrane thickened, and their stroma infiltrated with cells. The epithelial surface becomes covered with pus and mucus, and in some places it is thinned and in others thickened. Calculi and gravel of uric acid and oxalate of lime, and, later on, phosphatic concretions, may also be present in these parts. In very ephemeral cases in which the irritation or inflammation has not been long continued or severe, the renal parenchyma may not be invaded; but in most instances there is hyperæmia of varying grades of intensity, which may lead to connective-tissue infiltration of the stroma of the pyramids and cortex, degeneration of the epithelium, and atrophy of the glomeruli. In severe and chronic cases there may be true suppurative inflammation, in which event there is a true pyelonephritis.

Pathology of Pyelonephritis.—In ascending pyelonephritis one or both kidneys may become much congested and inflamed, and the pelvis coated with pus and fibrin. The renal parenchyma becomes swollen and studded with foci of pus. The larger of these foci are enclosed in areas of hyperæmia, and appear as white streaks or lines in the course of the tubes. In more advanced forms abscesses are scattered throughout the organs, which are very much congested. The very small foci can be seen only by means of the microscope, which reveals groups of pus-cells between the tubes, the lining epithelium of which is degenerated.

In most cases of pyelonephritis the walls of the ureters are inflamed and thickened, and they may contain pus or fibrin.

In descending pyelonephritis the kidneys become much enlarged, and present foci of suppurative inflammation resembling little white spots surrounded by areas of hyperæmic tissue. These spots consist of aggregations of pus-cells seated between the tubes, and they may lead to degeneration and necrosis of the renal parenchyma. These cases are instances of microbic infection and suppuration, which usually involve the pelvis of the kidney.

In the early stage of calculous pyelitis there may, as we have already seen, be but little change in the pelvis and calyces beyond mild hyperæmia of the mucous membrane. Later on, should the irritating cause persist, the mucous membrane of the parts may become thickened, their stroma infiltrated with cells, and their surface studded with tissue-exudates. From the inflammatory focus the kidneys may be attacked by chronic diffuse nephritis, in which there is hyperplasia of the connective tissue of the cortex; the cortex tubes are atrophied in some parts and dilated in others, and they contain exudates, casts, and

blood. The renal epithelium is swollen and degenerated. The cells of the glomeruli and their capillaries are at first increased in number, but they become atrophied later on. The kidneys are usually enlarged and either smooth or nodular, and they are variously designated as chronic parenchymatous nephritis, waxy kidney, the large white kidney, or chronic Bright's disease.

In pyelonephritis resulting from traumatism and perinephritis there is much degeneration of the organs, which become broken down and infiltrated with pus and blood.

In tubercular pyelonephritis the lesion usually begins in the mucous membrane of the pelves and calyces, and thence extends to the parenchyma, which becomes degenerated or converted into fibrous tissue infiltrated with pus. In some cases cheesy and calcareous degeneration may occur.

The various micro-organisms which cause renal suppuration are the Bacterium coli commune, the staphylococci, the streptococci, the proteus of Hauser, the gonococci alone or in combination with pyogenic microbes, and the Bacillus tuberculosis.

Chronic pyelonephritis may affect only one kidney or it may attack both. In some rare cases in which but one kidney is thus involved the organ previously unaffected becomes sympathetically involved, even when the primarily diseased organ has been adequately drained. The pathogenesis of this complication has not been determined.

Symptoms of Acute and Chronic Pyelitis and Pyelonephritis.—Acute pyelitis is rather rare, and usually is produced by gravel and calculi and by the irritation of various drugs taken into the system. The symptoms may be so mild that only moderate pain in the loins and frequent micturition are complained of; but in some cases the invasion is sudden, and the patient suffers from headaches, chills and fever, sweating, nausea, and debility. There are pain in the loins, frequency of urination, and decided tenderness on manual pressure over the kidneys or on deep respiration. The urine is rather scanty, loaded with mucus and pus, albuminous from presence of blood, and may contain epithelial cells from the renal pelvis. There may be reflected pain in the penis and testicle. The kidneys, as a rule, are not much enlarged.

In chronic pyelitis of local origin long periods may elapse without the appearance of appreciable symptoms. When a decidedly purulent stage is reached and renal disorganization has set in the symptoms are well marked. The pain in the loins is more severe and constant than in the lighter form and the changes in the urine more marked. At this time there is nephritis as well as pyelitis. There may or may not be polyuria, but the amount of pus present is decidedly increased. As a result, the urine is albuminous, which condition is intensified by

the addition of mucus and blood. By the microscope we find epithelial cells from the pelvis and the tubules of the kidney. Hyaline casts and pus-cylinders may also be discovered. In some cases the amount of blood which escapes is small, in others, it is very copious, while in a few it may be absent. Variations in the amount of pus and blood secreted may be observed from day to day.

When the ureter is pervious and the secretion drains off thoroughly, the urine usually remains acid, and a diagnosis of cystitis is not to be considered. But when calculi or tissue-detritus more or less effectually blocks a ureter (or both ureters) ammoniacal decomposition occurs, and it then becomes difficult to determine the seat of the trouble.

The unilateral and bilateral nephralgic pain and soreness may be constant or intermittent, and is aggravated on deep inspiration, and by jarring and sudden movements of the body and by manual pressure.

The kidney will be found, in some cases early and in others quite late, to be so greatly enlarged that the swelling can be recognized by the eye, particularly in thin subjects and when there is a complicating perinephritis.

Bimanual palpation should be thoroughly practised when these conditions are present. The patient is placed on his back, with head and shoulders slightly elevated so as to relax the abdominal muscles, and the thighs should be slightly flexed on the trunk. Deep pressure is made by placing the fingers of one hand on the anterior abdominal wall, and the fingers of the other on the posterior abdominal wall, between the last rib and the iliac crest. This method is of little or no value in fat subjects or when the muscles are rigid and fixed. General anæsthesia overcomes muscular rigidity. It is often of value in thin subjects, in floating and movable kidney, and when the kidney is enlarged, tender, or sensitive from any cause, viz., distention of its pelvis, malignant growths, etc. A distended colon may make the examination more difficult and incomplete.

With the intensification of the renal lesions and the increase in the suppuration the patient's health fails, and he becomes thin, anæmic, and exhausted. He loses appetite and suffers from chills and fever. Unless he is relieved by surgical intervention, death ensues sooner or later.

It is difficult to determine the time of invasion in ascending pyelonephritis, for the reason that the symptoms are masked by those which have previously existed in the ureters, bladder, prostate, and seminal vesicles. In these cases the predominating condition is the antecedent cystitis, in which the symptoms are very similar to those produced by the renal lesions. In all cases, as a rule, by a careful microscopic study of the urine, the condition of the kidneys and the bladder may be ascertained, so long as that fluid remains acid; but when ammo-

niacal decomposition has taken place, either in the pelvis of the kidney or in the bladder, or in both, the condition of the urine does not furnish precise data. In many cases the existence of ascending pyelonephritis is only determined with certainty at the autopsy. In all cases it is important that palpation of the kidney should be thoroughly practised, and in many it will give evidence of the existence of an enlarged and painful kidney. With the upward extension of the morbid processes from the bladder and ureters there is very often an intensification of the patient's symptoms, as shown by the increasing deterioration of the patient's health and strength, in the progressive emaciation, and in the chills and fever, dry tongue, rapid pulse, and general febrile phenomena. In these cases the fatal termination is due to anæmia and septicæmia.

The symptoms of descending pyelonephritis due to infectious disease are for a time obscured by general morbid conditions. There may be renal tenderness and pain, and enlargement of the organ may perhaps be made out. Frequent micturition and the passage of turbid urine loaded with bacteria, pus, blood, and renal tissue-elements may call attention to the kidney disorganization, and then a diagnosis may be made. In all these cases the dominating symptoms are those due to general blood-changes caused by micro-organisms.

The symptoms of pyelonephritis due to traumatisms are usually more or less severe pain in the loin, swelling and tenderness in the kidney, together with chills and fever and gradual emaciation. In such cases there are pyuria, polyuria, hæmaturia, and frequent and perhaps painful micturition.

What may be termed elimination-pyelitis and pyelonephritis, in which various drugs already mentioned (*vide supra*) are taken into the stomach and pass out through the kidneys, may not be accompanied by any symptoms. In some cases a mild febrile movement and pain in the kidney may be observed. Hæmaturia, pyuria, and bacteriuria may be ephemeral conditions in these cases, which, as a rule, cease when the irritating agent is eliminated.

The symptoms of renal tuberculosis are at first rather ill defined, particularly when the lesion is of primary development. In cases of tuberculosis of the intestines, lungs, and viscera, the kidney infection may not develop till a later period, and for a time its symptoms may be masked. Involvement of the kidney is attended by pain in the loins, and by frequent and perhaps painful urination. In the urine, blood, pus, tissue-detritus, epithelium of the pelvis, and renal parenchyma tubercle bacilli may be found. If operative intervention is not practised, or if the patient does not remove to a suitable climate, the usual symptoms of phthisis will be observed—gradual emaciation and loss of weight, hectic fever, and night-sweats.

When tuberculosis invades the kidney by extension from the bladder and ureter, its recognition may for a time be masked by the symptoms caused by the various affections of the genito-urinary tract, namely, the seminal vesicles, prostate, and testicles in men, and the uterus and ovaries in women.

The quantity of blood which escapes with the urine in renal tuberculosis is variable. It may be small in amount, or it may be very copious. It may be passed in small quantities during the day or in gushes. In many cases it is absent for longer or shorter periods.

In all cases of pyelonephritis, it is important that both kidneys should be carefully examined in order to determine whether the disease is unilateral or bilateral. To this end, palpation of the organ should be thoroughly made, and ureteral catheterization and Harris's segregator should be employed.

Diagnosis.—In general, the diagnosis is to be made between ascending and descending pyelitis and pyelonephritis. The symptoms of lumbar pain and perhaps of tumor point to the kidney as the seat of the affection, and a careful examination of the urine may then clear up all doubt. In addition, catheterization of the ureters or segregation of the urine by Harris's method may be of much value.

In many of the ascending cases the difficulty in diagnosis will occur in the coexistence of cystitis and pyelonephritis. By means of careful physical examinations and a scientific study of the condition of the urine the exact state of affairs may be learned. As a rule, so obvious are the symptoms of calculous pyelonephritis, of traumatism of the kidney, and of descending pyelonephritis, by a study of the case and the examination of the urine, that a clear diagnosis can be generally made. The diagnosis of tuberculosis of the kidney may for a time present some difficulty, but the study of the local symptoms and the microscopical examination of the urine, together with catheterization of the ureters, will generally clear up doubt. In many cases the loss of flesh and of health and the existence of tuberculous processes in the body in general will point to tubercular infection as the source of the trouble.

Treatment of Pyelitis.—Mild cases of pyelitis require rest in bed, a light nutritious diet, with perhaps local counterirritation and the hot bath. The urine should be rendered bland, non-irritating, and antiseptic by proper internal medication and suitable waters. If the pain is severe, it must be controlled by the guarded use of opium or morphine. The radical or operative treatment will be indicated by the recognition of the etiological factor. Operation should be deferred, as a rule, until the cessation of acute symptoms. If pyelitis is due to renal calculi, to an obstruction in the ureter, to hypertrophy of the

prostate, or urethral stricture, these irritating and obstructive lesions must be removed by suitable surgical procedures.

Treatment of Pyelonephritis.—These patients must be nourished by a liberal and carefully selected fluid diet, and counterirritation over the kidney by cupping and hot applications should be employed. The urine must be kept as antiseptic as possible by the administration of full doses of urotropin, boric acid, or boric acid and salol. Hot rectal irrigations of normal saline solution are often of marked benefit in these cases, and may be employed once or twice daily.

Treatment of Tuberculous Pyelonephritis.—These cases should be removed to a suitable climate and receive the usual constitutional treatment for general tuberculosis, care being taken to avoid anything that is liable to cause renal congestion. If the real nature of the disease is recognized sufficiently early, and the other kidney is functionating normally, some benefit may result from nephrectomy, although the other kidney is, as a rule, sooner or later attacked by the same process. Nephrectomy being out of the question, the patient receives antituberculous treatment, and, should pus form, it must be evacuated by a lumbar incision.

Suppurative Nephritis.

As a rule, it may be stated that in most cases of suppurative nephritis there is also a concomitant and perhaps secondary invasion of the pelvis, so that they are in reality instances of pyelonephritis. In some cases, however, the morbid process is confined to the renal parenchyma. It may exist in the form of localized foci or in a diffuse form. In some cases traumatisms by incised or punctured wounds, gunshot-wounds, and blows and falls are the exciting causes.

During the course of malignant endocarditis, pyæmia, and general infectious diseases emboli may pass through the renal arteries and produce foci of suppuration in the kidney-substance. In these cases, as a rule, the existence of renal lesions is masked by the symptoms of the general infectious process. Suppurative nephritis may attack one kidney, or both may be involved.

The symptoms are chills, fever, sweats, and vomiting. There are pain in the loins, suppression of urine, and an advancing typhoid condition which usually terminates fatally.

Treatment.—In the majority of these cases little, if anything, can be done except in a medical way; if, however, the suppuration can be distinguished as a localized condition, the pus can sometimes be evacuated by aspiration or by an exploratory lumbar incision. Removal of the entire kidney may appear advisable to the surgeon when the destruction of parenchyma has been great.

Perinephritis.

This condition is the result of various causes which result in suppuration of the fatty and connective tissues seated behind the kidney, which tissues, it should be remembered, surround the whole organ. In almost all cases the affection is due to suppurative inflammation which goes on to abscess-formation, hence the term perinephritic abscess is used by some authors. But it should be borne in mind that in some cases of chronic nephritis the fatty and connective-tissue envelope undergoes synchronous inflammation, and it then becomes converted into a fibrous capsule which is developed around the proper kidney capsule. This cannot be considered typical perinephritis as generally understood. Perinephritis may occur in a primary form in which the suppuration begins in the post-renal connective tissue, and in a secondary form, in which suppuration in a contiguous part burrows behind the kidney.

The secondary form of perinephritis is the one more commonly encountered, in which abscesses or infective processes by extension from the gall-bladder, spleen, or liver, or from the duodenum and intestine (chiefly the ascending and descending colon), or from the vertebræ and pelvic bones, from the appendix, and from the uterus and ovaries, and very rarely from the lung and pleura, invade the post-renal connective and fatty tissue envelope.

The primary form of perinephritis is much less common, and is generally caused by traumatism, such as contusions from blows and falls upon the lumbar region. In this category perhaps may be classed cases of perinephritis which have been caused by infections from open wounds in the integument behind the kidney.

It is not uncommon for perinephritis to develop from extension of the inflammation from the kidney itself in cases of suppurative nephritis, pyelitis, pyelonephritis, pyonephrosis, hydronephrosis (infected), and ureteritis.

Little can be said with precision as to the cases of perinephritis which have been termed spontaneous, and said to be due to a depraved condition of the system and exposure to cold and wet. In all these cases it is probable that the nature of the exciting cause was not made out.

When suppuration has become profuse, extrusion of the pus may occur from the abscess-cavity, and then it may rupture into the colon or stomach and into the pleural cavity. It may also burrow within the sheath of the psoas muscle, and open either under Poupart's ligament or it may follow the iliac vessels into the femoral region, or it may pass through the sacrosciatic foramen and spread to the gluteal region, and there form a urinary or renal fistula.

Symptoms.—The symptoms of perinephritis may for a longer or shorter time be obscure. It can be readily seen that in all cases of suppuration in the gall-bladder, spleen, liver, duodenum, intestines, and appendix, and of destructive diseases of the vertebræ and sacrum, and from inflammations of the uterus and lungs, the dominant symptoms will centre in these various affections, and that the perirenal lesion may be wholly obscured by them, until the perinephritis is sufficiently far advanced to give rise to demonstrable lesions. On the other hand, when the affection originates in traumatism, such as blows and falls and from punctured and incised wounds, the symptoms are, as a rule, promptly apparent.

The most constant and suggestive symptom is pain in the lumbar region above the iliac crest, which may develop slowly or promptly. If the patient is thin, deep pressure over the abdomen may lead to the suspicion of commencing perinephritic abscess, and by counterpressure over the loin (bimanual palpation) further information may be gained. Very soon the movements of the trunk and leg become impaired and are attended with severe pain. This may so increase that the leg becomes flexed upon the abdomen. As the inflammatory condition becomes more severe, locomotion may become impossible, and the thigh is adducted and the body bent forward. Febrile symptoms promptly supervene, being mild at first, and severe when the suppurative process becomes well established. Then the febrile movement may be very severe, and the patient may suffer from chills, rigors, and vomiting. If the pus points toward the lumbar region, a red brawny tumor slowly develops, in which, later on, fluctuation may be felt. If this abscess opens spontaneously, or if it is incised, the severity of the symptoms promptly subsides; but as long as the pus is walled up the symptoms continue severe.

From what has been stated, it can be seen that the salient symptoms of perinephritis are deep-seated lumbar pain, increasing difficulty of movements of the trunk and leg, and swelling in the lumbar region. When pus burrows in the directions mentioned a multitude of inflammatory and painful symptoms is developed, and a correct diagnosis can only be made by an intelligent study and examination of the case in all its phases.

Treatment.—Until the diagnosis of perinephritic abscess has been definitely made, the patient should receive the same treatment as that directed for suppurative renal diseases. When, however, abscess forms, its contents must be freely evacuated by a lumbar incision, and its cavity, the surrounding tissues, and the kidney itself, if it be implicated, thoroughly drained with tubes and gauze.

Pyonephrosis.

As a result of chronic pyelitis and pyelonephritis, an ureter may be obstructed, in which event the pelvis and calyces of the kidney become greatly dilated and contain urine, pus, and blood, and in many cases, in addition, tuberculous material, cancerous masses, diphtheritic membranes, and hydatids, together with urates, oxalate of lime, and carbonates and phosphates of lime. The resulting condition is called pyonephrosis, in which there is an elastic and perhaps fluctuating tumor of varying size in the loin which sometimes projects into the abdominal cavity. In some cases the blocking of the ureter is permanent, and then the renal tumor may become very large. In other cases there may be only an intermittent blocking of the ureter, and with the escape of the incarcerated fluid the size of the tumor appreciably lessens. In all cases of pyonephrosis marked structural changes take place in the kidney. The pelvis and calyces are dilated, and the papillæ are flattened and perhaps obliterated. As the process extends, the pyramids and the cortex of the kidney become atrophied and their structure destroyed, and a pouch-like abscess-cavity filled with pus, tissue-detritus, and inorganic matter is produced.

In some cases pyonephrosis is the outcome of hydronephrosis complicated with infection, as described later on.

In some cases of pyonephrosis drainage of the abscess-cavity may occur, and the patient may not experience much pain or discomfort; but in others the pelvis or degenerated renal tissue may undergo ulceration and rupture occurs. In this event the fluid may escape into the connective tissue around or behind the kidney, or into the iliac fossa and under Poupart's ligament; or the extravasation may occur into the lungs and bronchi, into the bladder, the intestines, or even into the peritoneum. In some cases pyonephrosis is unilateral, while in others both kidneys are thus attacked. As a rule, in pyonephrosis (as well as in pyelonephritis) there is a concomitant affection of other parts of the urinary tract.

It is sometimes observed in cases of pyonephrosis that the activity of the disease-process ceases and the tumor shrivels up. In this event the purulent fluid becomes inspissated, and a putty-like or mortar-like material is produced. In these cases the kidney becomes reduced to a small fibrous capsule, which may undergo calcareous degeneration.

Symptoms.—These are, in the main, those detailed in the section on pyelonephritis, but in pyonephrosis they are more severe. As a rule, the tumor is larger and the systemic reaction is more pronounced.

Diagnosis.—The presence of a round, perhaps fluctuating, somewhat painful tumor, together with marked pyrexia and intermittent pyuria, points in most cases to pyonephrosis as the cause. In such

cases a careful differential diagnosis should be made between the suppurative condition of the kidney, and fecal impaction of the colon, tumors of the spleen, liver, and gall-bladder, and from cancer and tubercle of the kidney, ovarian cysts, hydatid cysts, tumors of the suprarenal bodies, and aortic aneurism.

Prognosis.—This may be favorable when but one kidney is involved; but when both organs are affected it is unfavorable. Cases have been reported in which pyonephrosis existed for months and years, and in which the symptoms were not well marked and the patient's health was but little affected.

Treatment.—We may try to remove or dislodge the obstruction by having the patient drink freely of any suitable diuretic water. In the event of failure the kidney may be aspirated, incised (nephrotomy), and drained, and the ureter examined for the obstruction, or removed (nephrectomy), according to the state of the opposite organ and the patient's general condition. For a description of these operations the reader is referred to the section on operations of the kidney, in which the details will be found sufficiently described.

Hydronephrosis.

Etiology.—This condition is congenital or acquired, and is either due to dilatation of the pelvis and calyces of the kidney or a result of an obstruction to the escape of urine seated in the urethra, bladder, or ureter. In general, the dilatation is limited to the pelvis, but in chronic cases distention of the kidney-substance with atrophy is observed, together, perhaps, with chronic nephritis. Hydronephrosis, as a rule, is unilateral, and exceptionally both kidneys are involved. In such cases a very large tumor is produced, and in many it assumes enormous proportions.

Congenital hydronephrosis may be due to stricture of the urethra or ureter, or to malformation and duplicatures of the mucous membranes of these tubes. In some cases irregularities in the course of the ureters, looping of these canals and their abnormal insertion into the bladder-wall are the cause of the trouble. Acquired hydronephrosis may result from movable and floating kidney, twisting of the ureter from pelvic tumors (chiefly in women), a temporarily impacted calculus, or from ureteral obstruction from gravel.

Symptoms.—These are, as a rule, very slight at first. As dilatation of the pelvis increases there may be more or less pain and a dull, heavy sensation in the loin. There is no fever except in cases in which suppuration occurs, and then a pyonephrosis is produced. In many cases hydronephrosis is intermittent, due to the escape of urine at intervals; after such e[illegible] is temporarily lessened in

size. In some cases the development of hydronephrosis is very rapid, and then pain may be a marked symptom. In the cases in which the ureteral obstruction is caused by an impacted calculus or by gravel formation there may be attacks of vesical colic and the appearance of blood in the urine. When the hydronephrotic tumor is of extremely large size, it may cause much pain and distress, and adhesions may take place to the surrounding structures.

When only one kidney is attacked the other one, as a rule, undergoes compensatory hypertrophy.

Diagnosis.—The presence of a cyst-like tumor in the flank, with a sense of weight and some pain and discomfort, and sometimes the coexistence of renal colic, should lead to a suspicion of hydronephrosis. It is always well to consider the existence of ovarian cysts and intraligamental cysts being mistaken for hydronephrosis. In many cases aspiration and the chemical and microscopical examination of the contained fluid will furnish much diagnostic aid, and in nearly all catheterization of the ureter will clear up doubts.

Prognosis.—This will depend upon the cause of the affection. If malformations of the ureter cause hydronephrosis, particularly when double, death will occur unless surgical intervention is practised. In unilateral hydronephrosis the prognosis is usually good, but when it is bilateral it may lead to death. When hydronephrosis develops into pyelitis, pyelonephritis, and pyonephrosis the outlook is very serious.

Treatment.—If the blocking is due to ureteral obstruction, that condition must be remedied by exposing the ureter and removing an impacted stone, or straightening out a kink, or twist or loop. These conditions not being present, the kidney should be aspirated, or incised and the sac drained, or the entire mass removed by nephrectomy, having first ascertained the existence and condition of the opposite organ.

STONE IN THE KIDNEY.

In the vast majority of cases renal calculi are composed of uric acid; but, as is the case with vesical stone, they may be oxalic or phosphatic, and very rarely are made up of cystine or xanthine, their composition depending upon the patient's diathesis. The stone may consist of one salt or of many varieties, which are deposited around the nucleus, depending upon the chemical composition of the urine at the time and the diseased condition of the kidney or its pelvis.

Calculi originate in the secretory substance of the kidney or its pelvis, the urinary salts being deposited on a nucleus consisting of minute blood-clots, shreds of tissure, epithelial cells, or mucus, and held together by a peculiar albuminoid or colloid material from the urinary tract in irritated and diseased conditions.

PLATE XXIV.

RENAL CALCULUS.

kidney and rectal irrigations of hot saline solution. When the stone is impacted in the kidney, and by its presence threatens suppuration, or by blocking a ureter causes hydronephrosis or pyonephrosis, it should be removed by nephrolithotomy and the kidney drained, if suppuration has occurred; otherwise the incision may be closed with sutures if deemed advisable by the surgeon.

TUMORS OF THE KIDNEY.

New growths, or tumors, of the kidney may be benign or malignant in character. The former are of little clinical importance, as they rarely give rise to serious or even appreciable manifestations.

Among benign tumors may be mentioned papilloma of the pelvis, and fibroma, adenoma, and lipoma of the kidney-tissue proper.

The commonest and most important malignant tumors of the kidney are sarcomata and adenomata.

Sarcomata and Adenomata.

Sarcomata may arise either from the kidney proper or its pelvis, growing slowly in some cases and very rapidly in others, so that in a short time the mass practically fills the abdominal cavity. They are most frequently encountered in young children and infants, but are sometimes met with during adult life.

Adenomata generally spring from the cortex of the kidney, and in some cases remain small and non-malignant, while in others they grow rapidly, become very vascular, and soon degenerate into true carcinomata.

Symptoms.—Malignant growths of the kidney give rise to a hard lumbar tumor, which soon forms adhesions with the surrounding structures and viscera, thus rendering an accurate diagnosis as to its origin very difficult and sometimes impossible. Pain, which is constant and severe in some cases, is paroxysmal or absent in others. Hæmaturia is a more constant symptom; it also varies in amount and duration, being sometimes profuse and constant and followed by anæmia and great exhaustion, and again slight in amount and intermittent, coming on spontaneously or after exertion. As a general rule, to which there are some exceptions, these patients soon lose flesh and strength, and become very anæmic and exhausted; the appetite is impaired or lost, and they suffer from gastro-intestinal disturbances, such as nausea and vomiting.

Treatment.—If a correct diagnosis has been made at an early date, and before adhesions have formed, nephrectomy should be performed at once if the opposite organ is healthy; if, however, the disease is well advanced, little if anything can be gained by surgical intervention

PLATE XXV.

CYSTS OF THE KIDNEY.

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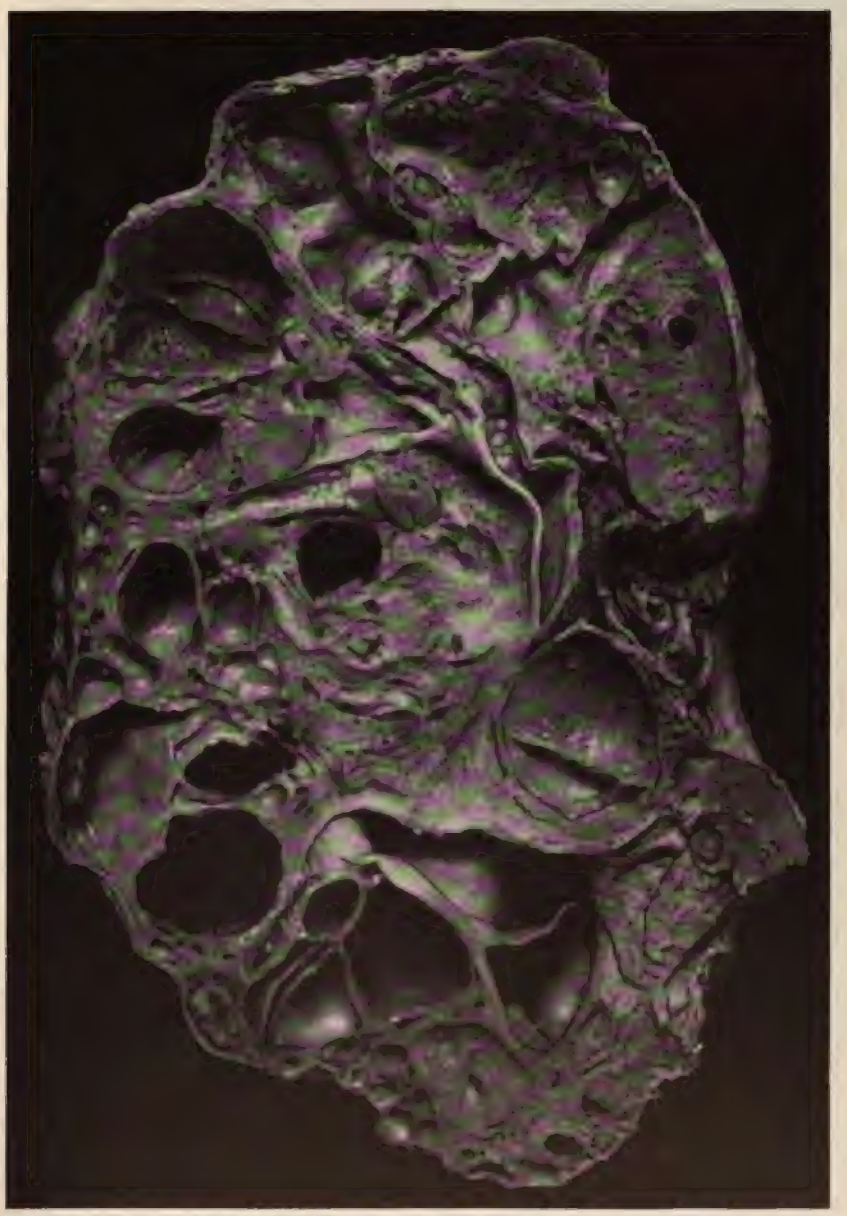

CYSTS OF THE KIDNEY.

In such cases the patient should be made comfortable and relieved from pain.

Cysts of the Kidney.

Cystic disease of the kidney may be either congenital or acquired.

In the congenital variety the kidney is greatly enlarged, being made up of an enormous number of cysts, while its tissue proper is practically absent. The cysts vary greatly in size, and contain a clear, yellowish, brownish, or even bloody fluid ; they are lined with flat epithelial cells, and consist of an enlargement of the tubules and capsules of the Malpighian bodies. (See Plate XXV.)

In the acquired variety there may be one or several cysts situated in apparently healthy kidney-tissue, which does not seem to be altered by their pressure, unless they reach large proportions.

Treatment.—If the cyst is large enough to require surgical intervention, nephrotomy and drainage, or even nephrectomy (partial or complete), may be performed, according to the requirements of the case, the condition of the opposite organ, and the judgment and experience of the surgeon.

Hydatid cysts of the kidney are, as a rule, very rare, and when present usually attack but one kidney, and are then associated with a similar condition in other organs either adjacent or remote. They may be situated in any part of the kidney, and, although usually small in size, they may in some instances reach enormous proportions. Their treatment is the same as that just given for simple renal cysts.

FLOATING, OR MOVABLE, KIDNEY.

Although attempts have been made to establish a clear distinction between floating and movable kidney, it is best to use the terms interchangeably, as the exact condition is only seen at the time of operation, and the treatment is the same for both conditions. Strictly speaking, a movable kidney is situated behind and outside of the peritoneal cavity, whereas a floating kidney is completely invested or surrounded by a fold of peritoneum.

Symptoms.—These patients suffer from acute and agonizing attacks of renal pain, coming on spontaneously or after exertion. The pain is sharp and cutting, or of a dull, aching character, and radiates down the loins and thighs. The parts over the kidney become tense and painful on manipulation, by which means the kidney can be recognized as a painful and movable tumor. In some cases there may be nausea and vomiting.

Treatment.—In mild cases the kidney can sometimes be kept in position and the attacks prevented by wearing body-bandages, corsets,

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Stones may be single and large, or multiple and small; their color, consistence, and appearance depending upon their chemical composition. They are usually found in the pelvis and calyces of the kidney or its infundibula, even in the kidney-tissue proper. They occur more frequently in men than in women, and in those who lead indoor lives without sufficient exercise in the open air and sunshine. (See Plate XXIV.)

Symptoms.—The symptoms of renal stone are subject to many variations, depending upon the degree of obstruction the stone offers to the passage of urine into the ureter, and also upon the amount of irritation and inflammation it produces as a foreign body in the pelvis of the kidney. Individuals have been known to carry stones in the kidney for many years without being aware of their presence, while some suffer intensely and at short intervals. As a rule, the latter patients complain of lumbar pain, extending along the course of the ureter into the testicle, which is sometimes forcibly and even painfully retracted. Attacks of renal colic coming on spontaneously or as the result of exercise or jolting are very common, and are associated with nausea, vomiting, and general prostration; urination becomes frequent and painful, and is often followed by vesical and rectal tenesmus; the amount of urine is decreased, and, unless prompt treatment brings relief, total suppression may ensue.

Hæmaturia varies greatly, but is never marked except after a sharp attack of colic, when the urine may be quite bloody or even contain a few small clots. These patients sometimes pass small calculi or fragments of stones by the urethra (see Plate XXIV.) during or just after the attack. The amount of pus in the urine depends upon the degree of inflammation in the kidney or its pelvis, and is therefore variable.

Diagnosis.—Stone in the kidney can usually be diagnosticated by a careful urinary examination, taken in connection with the patient's history and present condition. On palpation the kidney region is tender and tense, and in very thin subjects the region can be mapped out and sometimes calculi felt. These methods failing to make the diagnosis clear, the kidney should be exposed by lumbar incision, palpated with the finger, and explored with the needle; but even these procedures sometimes fail to detect small and impacted stones.

Treatment.—The treatment is palliative or radical, depending upon the degree of stone-formation. If the patient is passing large quantities of crystals, gravel, or sand, the diathesis is ascertained, and he should be put on appropriate dietetic and medicinal treatment to correct the condition of the urine, and the kidneys flushed with copious draughts of suitable waters. Attacks of acute renal colic are controlled by the hypodermic use of morphine—sometimes a general anæsthetic is required—and the hot bath; also, hot applications over the

kidney and rectal irrigations of hot saline solution. When the stone is impacted in the kidney, and by its presence threatens suppuration, or by blocking a ureter causes hydronephrosis or pyonephrosis, it should be removed by nephrolithotomy and the kidney drained, if suppuration has occurred; otherwise the incision may be closed with sutures if deemed advisable by the surgeon.

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Treatment.—In mild cases the kidney can sometimes be kept in position and the attacks prevented by wearing body-bandages, corsets,

braces, and appliances, and avoiding any kind of exercise that is liable to bring on an attack. These palliative measures failing, the kidney is exposed by the lumbar incision, returned to its proper position and fixed there with sutures (nephrorrhaphy or nephropexy). Should this operation be unsuccessful, the case urgently demanding it, a nephrectomy may have to be performed for the patient's comfort and relief, the surgeon always having ascertained that the opposite kidney is present and functionating normally, which can be done by cystoscopy, catheterizing the ureters, or collecting the different urines with the Harris instrument.

TRAUMATISMS OF THE KIDNEY.

The kidneys present so many anomalies in the distribution of their blood-supply, and in their size, shape, number, and position, that the surgeon should always ascertain the presence of both kidneys before performing a radical operation on one, and also be competent to cope with an anomalous arrangement of bloodvessels when ligatures during a nephrectomy are applied. The presence of both kidneys can be ascertained by palpation, or, this failing, by cystoscopy, either with or without catheterization of the ureters.

Contusion of the Kidney.

Contusion is the result of direct violence over the organ, as when patients fall upon or are kicked, hit, or injured in this region. The muscles are usually in a more or less relaxed condition at the time of the accident. The contusion may be severe or trifling.

Symptoms.—As a rule, there is more or less shock, depending upon the nature and extent of the injury. This is followed by severe renal pain, extending to the testicle, which may be retracted. The pain is either constant or intermittent, and may be accompanied with nausea and vomiting. Hæmaturia is absent, slight or profuse, depending upon the amount of damage done to the organ by the traumatism.

Treatment.—The patient is kept absolutely quiet in bed and well under the influence of morphine. Cold applications should be kept over the kidney, and ergot administered by the mouth to control bleeding. A firm body-bandage or strip of rubber plaster applied around the body will aid in keeping the parts at rest. The patient should be nourished by the rectum, since food by the mouth might excite nausea and vomiting, with increased bleeding. Shock is treated on general surgical principles. If urination is difficult, the patient must be gently catheterized to prevent straining and tenesmus. Should bleeding threaten life, an exploratory lumbar incision is to be made, and the hemorrhage controlled, if possible, by packing the wound and ligating

bleeding points, or, this failing, the surgeon is obliged to resort to nephrectomy.

Wounds of the Kidney.

Wounds may be due to stabs, cuts, or gunshot injuries. Their symptoms are in general the same as those of contusion, except that bleeding is likely to be more severe and to take place into the peritoneal cavity.

Treatment.—The wound is cleaned and packed in the usual manner, and the patient given the same treatment as that just described for contusion. If, however, the hemorrhage is profuse and shows no tendency to cease, then the kidney must be exposed and removed, or the bleeding points caught and tied if possible.

OPERATIONS ON THE KIDNEY.

The kidney may be exposed for palpation, needling, incision, or extirpation either through the loin or the anterior abdominal wall, the former being the safest of the two routes, as the peritoneum is not opened, the kidney lying behind it in the perirenal fat. The surgeon should always ascertain the existence of the other kidney and whether it is functionating normally before undertaking any form of operative interference. The abdominal route shows the existence of a second kidney, but this can usually be determined by the cystoscope, ureteral catheter, or the Harris instrument, or, in thin subjects, by abdominal palpation.

Nephrotomy.—By nephrotomy is meant an incision into the kidney-tissue for drainage in cases of renal suppuration or hydronephrosis, or for exploration of the kidney and its pelvis for stone or other abnormal conditions. The patient is placed on the opposite side, with a good-sized sand-bag pressing into the flank, so as to increase the space between the last rib and the crest of the ilium, an assistant at the same time forcing the kidney up into the loin by firm pressure on the anterior abdominal wall.

An oblique lumbar incision is then made an inch below the last rib, beginning at the outer border of the erector spinæ muscle and running forward for a variable (usually from four to six inches) distance, depending upon the requirements of the case, care being taken to avoid the pleura, which is sometimes quite low down and liable to injury by the knife, or tearing. The structures are carefully divided layer by layer and the vessels caught and ligated as the wound is enlarged, in this way keeping the operative field dry, which is extremely important in this operation. The fatty perirenal capsule having been exposed, is gently torn through and the kidney exposed and brought well into the wound, whose walls are retracted. The kidney is incised, and

explored with the needle or finger, and if pus or abnormal contents are found they are evacuated and the kidney drained with strips of gauze or a good-sized rubber tube, around which the wound is tightly packed, and one or two sutures taken at each angle. If no abnormality is found at the exploratory operation, the kidney and the wound should be sutured, care being taken to approximate similar muscles and structures with accuracy.

Nephrolithotomy.—Nephrolithotomy consists in the removal of calculi from the kidney or its pelvis by means of the oblique lumbar incision (nephrotomy) described above. When the kidney is explored the stone is sought for by palpation or the needle, and when found, either in the kidney or its pelvis, is removed through an incision by long forceps, the surgeon always being careful to contuse the kidney-tissues as little as possible. The orifice of the ureter is explored to ascertain if it is patent; the ureter itself is also examined. The incision into the pelvis of the kidney should be sutured to prevent leakage of urine in the wound and the formation of a urinary fistula. The kidney-tissue can also be sutured or left open, according to the conditions found and the requirements of the case. The parietal wound is drained with a large rubber tube, around which is packed iodoform gauze, the angles of the wound being approximated by sutures.

Nephrectomy.—Nephrectomy, or total removal of the kidney, is performed either through the loin or the abdomen, the former being the usual and safer route, although the latter may have to be employed in some cases.

Lumbar Nephrectomy.—The kidney having been explored by the lumbar incision, is drawn well out into the wound and freed from all surrounding tissues. The vessels and ureter are then separately and carefully ligated and divided between two ligatures, to prevent urine getting into the wound, which should be drained, packed, and partially sutured, or brought together by buried sutures, as the surgeon may decide, although it is far better to rely upon drainage for the first few days.

Abdominal Nephrectomy.—In this operation the kidney is exposed and removed through an abdominal incision in the linea semilunaris long enough to allow of its free manipulation. The intestines are held aside by pads of sterilized gauze, the kidney enucleated, and its vessels and ureter ligated and cut between two ligatures, as in the lumbar operation. The peritoneum is sutured over the kidney-fat and the abdominal wound closed, unless there is some contraindication. Lumbar drainage should be instituted if deemed necessary for the first few days, when it is removed and the wound allowed to granulate from the bottom.

Nephrorrhaphy, or Nephropexy.—The kidney is exposed by a lumbar incision and anchored firmly in its normal position by passing several silk or gut sutures through its substance and then through the lumbar fascia, so that when these sutures are tied the kidney rests or is held snugly against the abdominal wall. The organ is freed from fat and the sutures passed directly through it from its anterior to its posterior surface, and just inside of its convex border. The wound may be sutured, or left open and drained. Should this operation be unsuccessful, it may be tried a second time, and this failing, and the case urgently demanding it, the kidney should be removed.

CHAPTER XXI.

MISCELLANEOUS AFFECTIONS OF THE GENITO-URINARY SYSTEM.

HÆMATURIA.

STRICTLY speaking, hæmaturia (blood in the urine) is merely a symptom of many diseased or abnormal conditions of the urinary tract, and is not a morbid entity in itself. The urine may be only tinged with blood or it may contain so large a quantity that it is deep red and opaque. The blood may be in a fluid state or in clots of various shapes and sizes, depending somewhat on the origin of the bleeding. In the majority of cases bloody urine can be recognized macroscopically, but it is sometimes necessary to make a microscopic examination to distinguish between bloody urine and urine tinged a reddish brown from the presence of hæmoglobin (hæmoglobinuria), bile-pigment, an excess of uric acid, or such drugs as rhubarb, carbolic acid, or senna, which ingested in quantity may impart a bloody hue to the urine.

The hemorrhage may arise from the anterior urethra, the posterior urethra (including the prostate and seminal vesicles), the bladder, the ureters, or the kidney.

If there is oozing of a bloody fluid from the meatus, and if the first gush of urine is bloody and the second perfectly clear, it is safe to say that the bleeding comes from the anterior urethra, which can be examined by the endoscope and the diseased point located. When there is practically little or no bleeding from the meatus and both the first and second glasses contain bloody urine and perhaps small irregular clots, and there is increased frequency of urination, with perhaps tenesmus and the passage of pure blood after each act, we are warranted in supposing that the blood comes from the deep urethra, prostate, seminal vesicles, or neck of the bladder. A rectal examination will be of aid in these cases, since the surgeon can palpate the base of the bladder and the adjacent structures.

Hemorrhage from the bladder-wall does not necessarily cause increased frequency of urination unless the vesical neck be involved. In these cases the urine in both glasses is of a uniform bloody hue.

If the bleeding comes from the ureter or kidney, long, worm-like clots may be formed in the ureter and passed with the urine. In these cases the two- or three-glass test shows blood in equal amount in each glass. Bleeding from these parts is usually preceded or followed by

attacks of renal colic, and lumbar pain shooting down the ureter, which latter structure, with the kidney, is sensitive on manipulation, the overlying parts being tense and unyielding.

If the hemorrhage is thought to come from the bladder, ureters, or kidneys, the cystoscope will aid the examiner greatly, provided the fluid in the bladder can be kept fairly clear by lavage or the irrigating instrument. If the bleeding is of vesical origin, it can be located and seen; and if from the kidney or ureter, the blood will be seen issuing in little jets or puffs from the orifice of the ureter, provided the latter is not blocked by a clot or stone.

If the urine is so bloody that the cystoscope cannot be used satisfactorily, a very useful test can be employed to locate the vesical origin of the bleeding. It is known as the resorption test, and its action depends upon the fact that the vesical mucous membrane has no power of absorption except under diseased or abnormal conditions. The technic of the procedure is as follows: the bladder is irrigated with warm sterile water, all of which is allowed to run out; it is then filled with a 1 to 2 per cent. solution of potassium iodide, and in fifteen or twenty minutes the saliva is tested for iodine by adding the patient's sputum to a starch solution, which, if there is a lesion of the bladder mucous membrane, will give a blue color, showing absorption by the diseased or injured bladder mucous membrane.

In all cases of hæmaturia a history of traumatism, pain, or of some local distress or manifestation must be closely inquired into and considered by the physician and the data obtained, will be found of the greatest aid in establishing a correct diagnosis as to the origin of the bleeding. Thus, traumatism in the perineum from blows, kicks, or falls, if followed by bloody urine, either with or without bleeding from the meatus, always indicates contusion, laceration, or rupture of the urethra.

Wounds or traumatisms in the region of the bladder, ureter, or kidney, if followed by bleeding, always point to the seat of injury and the source of the blood, especially if the patient has increased frequency of urination with tenesmus or attacks of renal colic.

Treatment.—The source of the bleeding must be first ascertained, and the cause, if possible, removed by suitable medical or surgical procedures. Patients suffering from hæmaturia should be kept very quiet, and, if indicated, given ergot or gallic acid by the mouth; and if pain be present, enough opium to relieve it and keep them quiet. The local and operative treatment for hæmaturia will be found fully described in the chapters devoted to the affections of the urethra, prostate, ureters, and kidneys, and are therefore not repeated here, as hæmaturia is merely a symptom of traumatic or morbid conditions of these organs.

BACTERIURIA.

There is a very prevalent opinion that the urine of individuals not suffering from disease or presenting any morbid symptoms is always free from microbic admixture when in the bladder. It is now well known that the secretion may in passing through the urethra carry with it some or many of the usually harmless microbes which are constantly present in that canal. Recent observations, however, clearly show that the urine when in the bladder may contain many micro-organisms, some of which under favorable circumstances may become pathogenic and produce mild or serious illness.

The published cases of bacteriuria are not very numerous, and their details will not as yet admit of succinct didactic description, but they are suggestive. The details of eight cases reported by Krögius are interesting. Of these cases, three were in men and five in women of advanced age. The men had presumably been cured of urethral and bladder inflammation. The histories of the women showed that some had had antecedent pelvic affections and had been operated upon, others had borne children, while others still had been catheterized. In some of these cases, without known exciting cause, the urine became fetid, more or less opaque, and loaded with bacteria. In only one of these cases was increased micturition observed; but in some there were symptoms of ill-health, such as chills and fever and emaciation. These cases were not instances of urinary infection nor of cystitis. Other cases have been reported without inflammatory change in the large intestine and rectum, which were accompanied by bacteriuria, and the opinion has been advanced that the infection occurred from these parts and spread through the bladder-walls without producing cystitis.

Bacterial urine has a cloudy, opaque appearance, and when shaken an undulatory or eddying motion may be seen, as if it contained an impalpable powder. Its odor is like that of stale or decayed fish, and is very penetrating and nauseating.

The chief microbe found in bacteriuria is the Bacterium coli commune; but certain streptococci, the Proteus vulgaris, and the Bacillus subtilis may also be found.

Treatment.—Irrigations and instillations in the deep urethra and bladder may be beneficial in some cases. All intestinal and pelvic disorders should be actively treated according to indications.

INCONTINENCE OF URINE (ENURESIS).

By incontinence of urine is meant the inability of the bladder to retain its contents either wholly or in part. It is, strictly speaking, merely a symptom of many morbid conditions, and is not a disease in

itself; thus we have incontinence due to diseases of the nervous system without lesions of the urinary tract, and again incontinence due to pathological conditions of the urinary organs, such as urethrocystitis, prostatitis, hypertrophy, tuberculosis, malignant disease of the prostate, vesical calculus, hypertrophy of the bladder-walls, with great diminution of its capacity, and lesions of the vesical neck.

Treatment.—The cause of the incontinence must be sought for and removed. This knowledge may be obtained by a urinary analysis and an examination of the nervous system, followed by a local examination of the bladder, vesicles, prostate, and urethra. All diseased conditions should be treated, as already described in this work under the appropriate headings.

EPIDURAL INJECTIONS.—A novel and radical treatment of enuresis has been proposed by Cathelin. The injections are made into the sacral canal between the periosteum of the vertebræ and the dura mater. The canal is reached through its opening in the sacrum. The patient is placed in the Sims position, the area sterilized, and the small osseous tubercles just below and to either side of the last palpable spinous process are made out. The needle of an aspirating-syringe is then thrust through the skin drawn tightly between these two tubercles, the needle being held at an angle of 40 degrees to the sacral curve until it passes through the membrane covering the opening of the canal, when it is lowered to 20 degrees and pushed on into the canal. Five c.c. of sterile salt solution are usually injected at first, and later 10 or even 15. These injections are made at intervals of about one week, and favorable results are said to follow immediately. The injections seem to be in nowise harmful to the patient, and are no more painful than any hypodermic injection. The immediate effects are rarely even disagreeable. The rationale of the treatment is not fully understood, though it is conjectured that the result obtained may be explained on the basis of a vertebral inhibition due to traumatism exerted upon the nerve-roots and conveyed to the medullary centres.

We can await with equanimity the verdict of time on this procedure.

Incontinence in Children.

This form is, as a rule, nocturnal, although cases are met with in which it occurs during both day and night. It may continue from infancy, the child never seeming to be able to exercise control over the bladder musculature; or it may not begin until the third or fourth year, or even later. As a rule, the affection disappears as the child nears puberty.

Treatment.—In treating these young patients, the surgeon should always ascertain the cause of the trouble, and if possible remove it, and

to this end a thorough examination of the nervous system should be made; then a quantitative and qualitative urinary analysis will be necessary, as this will point to any kidney, vesical, or deep urethral trouble. If these examinations prove negative, we should ascertain whether the child is infested with worms or a lesion of the rectum or anus is present. A phimotic condition of the prepuce will sometimes cause incontinence, as will also stone in the bladder or congenital urethral narrowing. Errors in the management of the child, such as not urging him to urinate just before going to sleep, or awakening him at night and early in the morning for the same purpose, must be corrected and regulated. He must not be allowed to take much fluid during the evening and before going to sleep. Among the many drugs recommended for the relief of incontinence in children, belladonna and quinine are, as a rule, the most useful, beginning with small doses according to the age of the patient and increasing up to the full amount. The employment of local treatment by means of appliances about the external genitals is to be most emphatically condemned, since it is liable, by directing the child's attention to these parts, to be followed by masturbation.

CHAPTER XXII.

PREPARATION OF THE PATIENT FOR OPERATIONS AND OF INSTRUMENTS.

PREPARATION OF THE PATIENT.

For all operations of magnitude on the genito-urinary tract, the proper preparation of the patient, both locally and constitutionally, is a most important factor in the ultimate outcome of the case, and should, therefore, be attended to most minutely.

The urine must be thoroughly analyzed, both chemically and microscopically, and quantitatively determined, and suitable measures instituted to ensure its amount normal, to correct its reaction, and to make it as bland and non-irritating as possible.

The heart and lungs are next examined, and if abnormal conditions exist they should be dealt with according to indications.

Tonics in general, but especially full doses of strychnine and quinine, are of great benefit both before and after operations on the genito-urinary tract.

Bland and non-irritating bladder and urethral irrigations should be given when indicated for several days prior to operation, and the patient made to urinate just before taking the anæsthetic. The patient should be kept very quiet for a day or so before the operation. On the night before, a cathartic pill should be given, and a few hours before the operation he should receive a warm saline enema.

On the preceding night the operative field is shaved, scrubbed with soap and hot water, and then covered with a 1 : 2000 wet bichloride and oiled silk dressing, which is held in place by a suitable bandage.

The patient being anæsthetized, the operative field is scrubbed with tincture of green soap and hot water, then with equal parts of alcohol and ether, then with a 1 : 2000 bichloride solution, and finally with sterile salt solution. The surrounding parts should be covered with towels moistened with bichloride, over which are laid dry sterilized towels. It is most important to have all solutions and towels that come in contact with the patient kept warm.

The preputial cavity must be thoroughly cleansed as described above, the penis being bandaged in a wet bichloride dressing in all operations in which the urethral route does not form a part.

It is necessary to emphasize the fact that in these patients the bowels should be freely moved every day following the operation.

PREPARATION OF INSTRUMENTS.

All metal instruments, except knives, are scrubbed with soap and hot water, then rinsed in hot water and boiled for fifteen minutes in a 2 per cent. carbonate of sodium solution. Thus prepared, the instruments are laid in trays of warm sterile water or saline solution.

Knives are first washed in soap and hot water, then in sterile water, and laid in absolute alcohol, or 1 : 20 carbolic acid solution, from which they are taken for use.

Soft-rubber catheters should be boiled, as may also most of the new make of woven and gum elastic instruments, their interior having previously been cleansed by injecting hot soapsuds and then plain hot sterile water through them.

Filiform bougies must not be boiled, as it renders them soft and unfit for use. They are washed in soap and cold water, rinsed in sterile water, and wiped dry on sterile gauze, in which they are laid ready for use.

For the lubrication of instruments, lubrichondrin, white vaseline, glycerin, or olive oil may be employed, all of them being thoroughly sterilized just before use, and kept either in collapsable tubes or tightly stoppered deep glass jars.

CHAPTER XXIII.

THE CHANCROID, OR SOFT CHANCRE.

Nature of the Chancroid.—Such is the general acceptance of the term "chancroid" or "soft chancre" in this country, in contradistinction to the hard chancre, or initial lesion of syphilis, that it is well to retain it.

The chancroid is an infectious ulcer of the genitals, inflammatory in its nature and very destructive in its course. It never, under any circumstances, leads to syphilis nor any form of systemic infection. Its action is purely local to the parts upon which it develops and to the lymphatic vessels and ganglia in immediate anatomical association with those parts.

The vehicle of infection of the chancroid in clinical practice is the secretion of a chancroid, of chancroidal lymphangitis, of a chancroidal bubo, or of a serpiginous chancroidal ulcer. Besides these secretions, inflammatory pus and pus resulting from severe irritation of syphilitic lesions are also capable of producing chancroidal ulcers *de novo* in both male and female, the person from whom the infection is derived being perhaps free from active chancroids at the time.

A marked peculiarity of the chancroid is its amenability to reproduction upon its bearer by auto-inoculation. Its secretion may be transmitted to the lower animals by inoculation.

Modes of Infection.—Chancroidal contagion takes place most commonly, in the lower classes, by actual contact, the pus being transferred from one person to another in the act of coitus or in some other intimate mode of direct transfer. This mode is called "direct infection." While in syphilis mediate infection is rather common, in chancroid it is quite rare. Instances in which patients have transferred chancroids by means of their fingers or nails to other portions of the body through scratching or other modes of transference occur, though very rarely.

It is probable that chancroidal inoculation in sexual intercourse in many instances takes place as a result of more or less well-marked erosions, abrasions, tears, and rents in the mucous membrane, and even on the surface of herpetic vesicles. It is also fair to assume that the balanopreputial mucous membrane, with its delicate epithelium and its rich and very copious capillary system, especially as it is subject to the heat, moisture, and maceration affecting the structure of the parts, may

be eroded by the irritating pus and become the seat of chancroids. This secretion may lodge in the ducts of the sebaceous follicles of the integument of the penis, and there produce ulceration.

Chancroid being classed as a venereal disease, the physician instinctively concludes that a given ulcer that is presented to him must of necessity have originated in sexual contact. In many cases this supposition is not correct, for chancroids may, as we have seen, originate in some subjects *de novo*. In other words, it is not very uncommon to see chancroids in men who have had no sexual exposure whatever, such lesions being perhaps due to inherent peculiarities of their tissues, to some diathetic condition or debility, or to contamination with particles of dirt that have lodged upon their genital organ. This mode of origin of the chancroid has been conclusively demonstrated to me by very many cases in which herpetic lesions became transformed into actively destructive chancroids. Such cases are far from rare, and if the practitioner will carefully interrogate the patients that come to him suffering from chancroids, he will in many instances find that there has been no exposure within the time required for the development of these lesions, and he will convince himself beyond all doubt that the ulcerative lesions are due to some unknown source of contamination of herpetic vesicles, of chafes, abrasions, or fissures. Simple inflammatory lesions of the genitals, therefore, become converted into typical chancroids—or, as we may say, wound-infections or septic ulcers—undoubtedly as the result of contamination with pyogenic microbes. Pus taken from these chancroids in syphilitic subjects will, as a rule, be seen to possess great potentiality in the extent and persistence of the ulcer and in the power that it possesses of producing by inoculation similar lesions for many generations.

In some of these cases of chancroid that develop *de novo* in syphilitic subjects contamination of the inguinal ganglia takes place by direct lymphatic absorption. As a result we have two forms of bubo—the irritative, which may be aborted; and the inflammatory, which leads to abscess.

It is very probable that in the tissues of syphilitic subjects the pyogenic microbes find a most favorable nidus. The inflammatory process to which they give rise is often very active, and the resulting pus, rich in microbes and their poisons or tissue-products, is much more virulent and destructive than that of their congeners, which are caused by the various forms of simple pus.

Chancroidal pus and pyogenic microbes may attack the hard chancre and cause it to resemble chancroid. The resulting lesion is called the mixed chancre.

Bacteriology of the Chancroid.—Within the past ten years several

observers have endeavored to prove that in chancroidal pus and in mucous membranes the seat of chancroidal ulcerations they have found a specific micro-organism, which is known to-day as the streptobacillus of Ducrey; but their descriptions and observations are faulty and lacking in many essential particulars, and they fail to carry conviction.

These observers, who devote so much time to the microscopic study of the soft chancre, are silent about its multifarious origin. Chancroid bears the same relation to mucous membranes that impetigo and ecthyma do to the general integument. Knowing as we do that chancroid may arise from so many different pyogenic processes, that it can be readily produced at pleasure by any one who will take the trouble to make the necessary experiments and inoculations, that it frequently arises *de novo* when the genital parts are subjected to irritation, dirt, and uncleanliness—it is utterly absurd to call it a specific process and due to a special specific cause. This streptobacillus is a pus-producing agent, it may be that it follows in the wake of the well-known pyogenic microbes, after the manner of mixed infections. It must be distinctly borne in mind that when chancroidal pus is examined with high powers and oil-immersion by means of the microscope, it is invariably found to contain staphylococci, streptococci, indifferent cocci, and bacilli. The science of bacteriology is not yet far enough advanced, nor are its results sufficiently accurate and extensive from a diagnostic point of view, to warrant the statements which have been made concerning this streptobacillus.

Description of the Ducrey-Unna Streptobacillus.—The streptobacillus of soft chancre was found in pus first by Ducrey, and later in the tissues by Unna. It is a rod-like bacillus with rounded ends. The dimensions vary from 1.5 to 2 μ in length and from 0.3 to 1 μ in breadth. This micro-organism is found singly, but it shows a tendency to form chains and to become agglomerated in masses. In the pus it occurs singly, but more frequently in chains. In the tissues it is found almost entirely in chain-form. It has been found in all soft chancres examined by Unna, and also in the pus of chancroidal buboes. It stains with carbol-fuchsin, gentian-violet, and anilin-water solution, and is decolorized by Gram's method—a characteristic by which it may be differentiated from other organisms occurring in chancroidal pus.

Recently the Unna-Ducrey bacillus has been successfully cultivated by Bezançon, Griffon, Le Sourd, and Lincoln Davis of Boston. These observers obtained pure cultures in several cases from chancroidal buboes opened under aseptic conditions, and from extragenital chancroids. Of the latter, one was the result of auto-inoculation upon the thigh from a genital lesion; the other was an artificial inoculation upon the abdomen from a genital lesion. The culture-medium used was rabbit's blood-

agar in a proportion of one-third to two-thirds agar; also uncoagulated rabbit's blood-serum. The colonies were described as appearing at the end of twenty-four hours, on the solid media, as bright round globules which attained their complete development in forty-eight hours, becoming then opaque and grayish. They were 1 to 2 mm. in diameter, and never became confluent. When stained and examined they were found to be composed of bacilli grouped in masses or arranged in chains of three or four elements. In morphology these bacilli corresponded to the

FIG. 112.

Section of a chancroid, showing the streptobacillus of Ducrey-Unna in the tissues. The chains are composed of minute rods arranged linearly, mostly in two or three parallel rows, and they give off branches in their course. Single rows of the bacilli are also found. They lie between the cells, not in them, and are situated especially in the superficial layers of the tissues. Deeper down in the section they are not seen.[1]

descriptions of the organisms of Ducrey and Unna. In the water of condensation the bacilli were found arranged in long, sinuous chains in which the individual elements were smaller than in the surface colonies.

The growth of the bacilli was equally good in rabbit's blood-serum uncoagulated. Their vitality in this medium, however, was short, while on blood-agar it exceeded three weeks. All attempts at cultivation on ordinary media failed, even after acclimation through a series of tubes of blood-agar. Typical chancroidal lesions were reproduced on three occasions in man by inoculation from pure cultures. From these chancroids of inoculation the organism was recovered in pure culture. Animal inoculations were in all cases negative. Monkeys were not used.

This work of Bezançon and others has since been confirmed by Simon, and very recently by Tomaszewski in a small number of cases.

Nicolle was the first to produce the disease in animals by inoculation of chancroidal pus. He succeeded in doing this in 1900 with certain species of monkeys, notably the *Semnopithecus*.

[1] This drawing was kindly made for me by Dr. George T. Elliot from a section made and stained by Unna.

Recently Holub, a Russian observer, has reported the growth of the streptobacillus of Ducrey in the internal organs of various insects inoculated with chancroidal pus. More recently, 1903, Lincoln Davis successfully inoculated cultures of the Ducrey bacillus upon a monkey of the genus *Maccasus Nemestrinus.*

Appearances of the Chancroid.—Chancroidal ulcers have no period of incubation, since the destructive action of the pus or of the pyogenic microbes begins at once, and the resulting lesion is apparent as soon as the morbid action penetrates beneath the epithelium. Thus, when this layer is thick the appearance of the chancroid may be delayed, and very often some time elapses during which the pus is entering a follicle. Constitutional conditions in many cases influence the rapidity of development. Chancroids on mucous surfaces develop much more quickly than upon the integument. Abrasions, excoriations, and fissures in the mucous membrane afford favorable doors of entry, and upon them chancroids develop with great promptness. As a rule, inflammatory action is very apparent within twenty-four hours after the implantation of the pus on mucous membranes, and within forty-eight hours in general the pustular nature of the lesion can be readily made out. In other cases the progress may be slower, and three or four days may elapse before the chancroid pustule is fully formed.

Upon mucous membranes the first sign of a chancroid is a minute yellow spot surrounded by a halo of intense redness, which shades off into the surrounding pink color. If not ruptured, the yellow central spot grows larger and higher, and very soon a typical conical shaped pustule is formed. Upon the integument the same yellow spot and red halo are present, and the pustular condition may be present or may be replaced by an ulceration.

In most cases on mucous membranes chancroids very early lose their epithelial dome, which constitutes the pustule, and the typical ulcer is then seen.

The outline of a chancroid is usually either round or oval, according to the conformation of the parts upon which it is seated; but when developed upon a fissure or abrasion it may be linear or irregular. Irregularity of outline also results from the coalescence of a number of chancroids. On the prepuce and in the sulcus they are circular; about the frænum they frequently are oval; when developed partly on the glans and partly on the prepuce they are irregular, for the reason that the ulcerative process is more active on the former than on the latter. Chancroids at the orifice of the prepuce and at the anus have a tendency to follow the radiating fissures peculiar to these parts. A comprehensive idea of the clinical feature of chancroids may be gained by a survey of Plate XXVI. Fig. 1 shows incipient chancroids on the

inner lamella of the prepuce, while in Fig. 2 a well-developed chancroid of the integument is portrayed.

Whatever the shape of the chancroid, the edges are sharply cut and abrupt, as if punched out. The whole thickness of the epithelium is destroyed, and it can be seen that though cleanly cut, as is the resulting lesion, the edges of it are undermined in some cases to such an extent that the tip of a probe can be carried circumferentially around the ulcer and under it. This feature of undermined edge is due to the fact that the soft subepithelial tissues are less resistant than the more horny epithelium. In addition to the undermined condition, the edges are frequently minutely uneven or jagged, as best seen by a magnifying-glass, showing that the destructive action takes place by minute radiating processes. Around the edge of the chancroid is an areola of redness which varies in depth and width according to the stage of the inflammation. This red halo extends *pari passu* with the ulcer. The floor of the latter is peculiarly uneven and worm-eaten in appearance, and in its early stage covered with a light yellowish pellicle composed of disorganized tissues and pus. With the growth of the ulcer this film becomes thicker and forms a bright or golden-yellow pseudomembranous layer, which is shown with admirable fidelity in Figs. 1, 2, 3, and 4 of Plate XXVI. This membranous pellicle covering the chancroid is thrown into little uneven mammillations, which correspond to the minute rugosities which cover the surface of the ulcer.

The secretion of chancroids is in the active stage quite abundant, and, while purulent, the pus differs from that of gonorrhœa. It is thinner in quality and usually of a brownish or rusty-brown tint, due to the admixture of small quantities of blood. This chancroidal pus under the microscope is found to consist of pus-globules, red corpuscles, and the detritus of tissues and micro-organisms.

The underlying bed, as it may be called, of chancroids should always be attentively studied. It usually consists of ordinary inflammatory œdema, and is felt between the thumb and finger as a mass firm in consistence midway between ordinary œdema and a furuncle. It yields to firm pressure, though not doughy, but has not the dense consistency of the true hard chancre. This œdematous infiltration of the chancroid is not very sharply limited, but becomes gradually less in the surrounding tissue.

In the typical hard chancre the induration, on the other hand, is condensed and sharply circumscribed. This symptom, to a certain degree important in the diagnosis of the chancroid, is often much obscured by injudicious cauterization, particularly when the solid stick of nitrate of silver is vigorously used, and also when chromic acid, pure sulphuric acid, and indeed any very caustic application, is made. A

PLATE XXVI.

CHANCROIDS.

similar misleading hardness is very often felt after active cauterization of herpetic vesicles, abrasions, fissures, and vegetations.

The **duration** of the period of activity of chancroid is so variable that it is really indefinite. It is influenced largely by the intelligence and efficiency of the treatment, the care and attention of the patient, and by his general condition and modes of life. Alcoholic indulgence is a prolific cause of chronicity and activity of chancroidal ulceration, and plethora tends to increase it. A very active life, much walking, and physical exercise likewise tend to perpetuate the existence of these sores.

On the integument the ulceration is slow, and there is not the marked tendency to extension that there is on mucous membranes. In some instances the ulceration extends quite superficially over considerable surface. Then, again, the ulceration grows in extent by the fusion of a number of chancroids, as depicted in Fig. 6 of Plate XXVI., in which it will be seen that a large portion of the surface of the integument of the penis has been invaded. In Fig. 4 an active chancroid is seen complicated by the development of another chancroid in the course of the lymphatics, called bubonulus—a feature first described by Nisbet.

The stage of repair of chancroids is indicated by a number of changes in all of the features of the ulcer. Perhaps the most noticeable one is a diminution of the inflammatory areola and a subsidence of the underlying œdematous infiltration. Then the grayish-yellow well-marked pseudomembranous layer begins to disappear, and as it does healthy pink granulations spring up over more or less of the surface and the unhealthy pus becomes gradually laudable. The undermined edges lose their deep redness and gradually disappear, and the ulcer becomes saucer-shaped. Coincidently with this, healthy granulations develop over the whole surface and push upward, gradually becoming even with the parts around.

A remarkable feature of the chancroidal ulcer when not kept scrupulously clean is its tendency, even in the reparative stage, to retrogress and assume all of the attributes of activity. In such cases, however, there is usually some well-defined cause for the exacerbation, such as carelessness, and particularly uncleanliness, sexual intercourse, or alcoholic excesses.

Seat of the Chancroid.—In the male the chancroid is most commonly found in the sulcus behind the glans; on the inner surface of the prepuce; on and near the fourchette, particularly on the fossæ on each side of it; on the lips of the meatus and within the urethra; upon the sheath of the penis; on the glans; and, usually by auto-inoculation, on the scrotum and thighs, pubes and anus. They occur on the finger by

infection from genital sores, and upon the face by means of the fingers, and within the anus from pederasty. In women they are found at the introitus vaginæ; on the fourchette and vestibule and on the clitoris; on the labia minora; within the vagina (rather rarely); on the os uteri; on the labia majora, and by auto-inoculation on the integument of the latter bodies; upon the perineum, inner surface of the thighs; on the hypogastrium, and around the margin of, and within, the anus. (See Fig. 113.)

Upon the external and integumental surface of the labia majora chancroids often assume the appearance of pustules or abscesses in consequence of the pus having inoculated one or more of the follicles (follicular chancroids); and there is frequently more or less œdema of the subcutaneous cellular tissue, as evinced by the swelling and hardness of the labia. When the pustule breaks the underlying ulcer, if exposed to the air, becomes covered with a scab and resembles ecthyma.

Chancroids are also common on other portions of the vulva and on the internal surface of the labia majora, where they occasion pain and difficulty in walking. Vulvar ulcers become much inflamed from the irritation of the urine and vaginal discharges, which likewise renders them difficult to cure.

Varying Features of Chancroidal Ulcers.—The most simple form of chancroid is very shallow (see Plate XXVI., Fig. 1); the undermining of the edges is very slight, and the worm-eaten unevenness of the base very delicate. This condition may really be but the early stage of the ulcer, and appropriate treatment very soon brings about the reparative stage.

Upon surfaces where mucous membranes and integument meet, and upon the mucous membrane lining the labia majora, and on the skin in the region of the genitals, rounded conical elevations surmounted with a minute pustule are sometimes seen. The pustule increases in size, and forms an ulcer which presents a crater-like appearance, as sometimes seen in acne indurata. This lesion is called the *follicular* or *acneform chancroid*, and results from the destructive action of the pus, beginning in the hair- or sebaceous follicles and accompanied by much inflammatory swelling. It is shown in Fig. 113 on the upper part of the left labium majus. (Comparison of the outlines furnished by this figure with the colored figures will give a clear idea of chancroids in women.)

What is termed the *echthymatous chancroid* is always met with upon the integument, particularly upon the penis and those parts of the genitals of both sexes which are not macerated with perspiration or which are not in coaptation. This variety of chancroid resembles in many of its features chancroidal ulcers produced by inoculation. It begins as a small red spot, commonly around a hair-follicle, which increases rather

slowly, with a small, more or less perfectly formed, pustule in its centre. As the redness extends the pustule flattens to a blackish-green crust, and thus may attain an area of nearly half an inch before its nature is suspected by the patient. Removal of the crust reveals a typical chancroidal ulcer, with the exception that the sharply punched-out and undermined edges are thicker, as they are composed of epidermis;

Fig. 113.

Chancroids of the labia minora, of the contiguous integument, and of the margin of the anus.

the floor is deeper, corresponding to the thickness of the skin; and the base is more markedly uneven and worm-eaten. The ulcer is usually slow in its course, and secretes a moderate amount of pus, which constantly dries into a crust. Upon the integument of the penis or on the outer surface of the labia majora, where it frequently occurs, this chancroid is sometimes accompanied with lymphangitis and adenitis. It is well shown after the removal of crusts in Fig. 113.

In some cases of chancroids, particularly when they are seated upon the prepuce near the sulcus glandis and upon the labia minora, or on any part, in short, in which, owing to its conformation, irritation is apt to be severe, the bed, as we may call the underlying tissues, is sometimes the seat of more than usual œdema and cell-infiltration. The result is, that the chancroid is elevated above the surrounding plane, and it is then called the *ulcus elevatum*. In like manner, there is a syphilitic elevated ulcer. The salience of the ulcus elevatum is by some authors incorrectly said to be due to exuberant granulations, whereas inspection will show the typical chancroidal surface, with usually less undermining of the edges of the ulcer. A very good idea of the ulcus

Fig. 114.

Serpiginous chancroid of groin and gluteal region.

elevatum may be obtained from inspection of Fig. 3, Plate XXVI. (lower and right-hand lesion), and the larger oval lesion on the right labium minus in Fig. 113.

These ulcers, showing a tendency to extend rather superficially over more or less surface, are called *serpiginous* chancroids. The term should be applied to cases which show progressive extension, and in which the lesion creeps over much surface. Such cases perhaps deserve this designa-

tion. In America we, for the most part, apply the term "serpiginous chancroid" to a chronic, more or less deeply destructive, ulcer which usually has its beginning in a chancroidal bubo. These ulcers, happily rare, have a deep, irregular, fungating surface covered with a rather thick, uneven, variegated, brownish-red and grayish-green slough or membrane and a sanious pus, and having thick, bluish-red, undermined, and often everted edges extend irregularly over the abdomen and thighs. These destructive ulcers are nowadays very rarely seen. Owing to our more efficient treatment and to the thoroughness of antisepsis it is very probable that in the future serpiginous chancroid will become a great rarity.

What is termed *phagedenic chancroid* is an example of the most serious complication of the local infectious ulcer. Phagedena is a rather infrequent complication of both chancroid and hard chancre, and, in my experience, occurs more frequently in the course of an initial lesion than in that of the chancroid. For its production no special virus is required. It originates in local causes, such as neglect of treatment and improper treatment of chancroids (intemperate cauterization, or where they are so situated that it is difficult to thoroughly irrigate them, as in chancroidal phimosis.

The course of chancroidal phagedena presents many features which point to a secondary bacterial infection complicating the chancroidal ulceration.

Varieties.—CHANCROIDS OF THE MEATUS.—These chancroids are not very common, and when present involve one or both sides of the orifice. They may extend downward and involve the whole fossa navicularis.

CHANCROIDS OF THE VAGINA are very rare, except in old syphilitic subjects.

CHANCROIDS OF THE OS UTERI are also exceedingly rare, and when present resemble those seen in the vulva.

CHANCROIDS OF THE ANUS AND RECTUM.—Chancroids of the anus and rectum may occur in either sex from unnatural coitus, but are more frequent in women, owing to the facility with which these parts are soiled with the secretion of sores situated upon the vulva. When seated upon the margin of the anus they may readily be mistaken for fissures. They are attended by much pain, especially during the passage of the fæces, which should always be rendered liquid before going to stool by a mucilagenous injection.

Chancroids of the folds of the anus, even when cured, may terminate in fissures which are very difficult to heal, in consequence of the frequent passage of the fæces and the spasmodic contraction of the sphincter ani. In such cases the only certain means of relief is to be

found in the forcible dilatation or rupture of the sphincter as employed in ordinary cases of fissure of the anus.

Chancroids of the anus and rectum not unfrequently escape observation from the natural reluctance of patients, especially women, to have this part of the body examined; and, indeed, the surgeon himself is often content with an inspection of the external orifice of the alimentary canal when a digital examination would reveal the presence of a chancroid in the rectum.

Chancroids upon the Integument of the Penis.—The majority of ulcerations seated upon the integument of the penis are chancres, and not chancroids; therefore the surgeon should be very careful in his diagnosis of lesions in this region. The rule, however, is far from being invariable, for I have met with many cases of simple chancres situated between the preputial orifice and the root of the penis, and even upon the pubes. Chancroids upon the integument of the penis often originate in a follicle, and when first noticed resemble a pustule or small abscess (follicular chancroids).

Chancroids of the Frænum.—Chancroids of the frænum are especially painful, persistent, and liable to hemorrhage. They may commence either upon the free margin or at the base of the bridle. In the former case a rent or fissure, the result of violence during coitus, has probably been inoculated, and the resultant chancroid gradually eats away the whole frænum and hollows out a narrow longitudinal groove upon the under surface of the glans, giving great annoyance, long persisting, and resisting ordinary modes of treatment.

Chancroidal pus under favorable circumstances may produce characteristic lesions upon any part of the integument of the body.

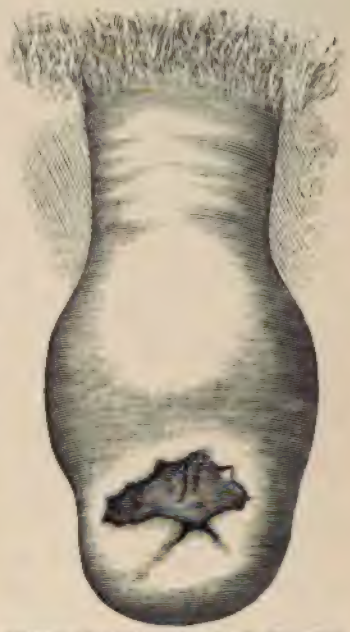
Subpreputial Chancroids.—Chancroids beneath the prepuce are usually multiple, cause much inflammatory œdema, and exhibit a marked tendency to extensive ulceration. In proportion as the prepuce is long and tight at its orifice there is a tendency to the production of chancroidal phimosis. In many cases chancroidal ulcers form at the preputial orifices of the fissures, which may be present there as a result of efforts to retract the prepuce.

Chancroidal Lymphangitis.—Inflammation of the lymphatics is a not very frequent complication of the chancroid. It is sometimes seen as heat, redness, pain, and a cord-like condition of these vessels on either side of the penis, corresponding to the chancre. This condition may end in inflammation of the inguinal ganglia and its subsidence, or it may go on to the formation of chancroids along the sides of the penis, and even at its root, low down on the pubes, as seen in Fig. 4, Plate XXVI.

Chancroidal Phimosis.—This is a somewhat rare complication,

and is found mostly in dispensary and hospital patients. Chancroidal phimosis is usually due to want of care of subpreputial lesions, and frequently to a too severe cauterization of them. The prepuce then becomes very red, swollen, and often quite painful, and from its orifice a dark-green or rusty-colored pus escapes in considerable quantity. The penis then becomes so much swollen at the glandular portion that it resembles a miniature Indian club. If relief is not given by operation or the chancroidal process stayed by intrapreputial antiseptic injections, the whole prepuce continues to become larger and more dusky red, the suffering of the patient greater, and the discharge is then very copious and of very bad odor. Then, not infrequently destruction of the tissues at the preputial orifice occurs, as shown in Fig. 115. If relief is not afforded, the inner leaf of the prepuce or the glans penis is more or less destroyed. In some cases ulceration occurs through the prepuce, and through the hole thus formed the glans then protrudes. In these severe cases nearly the whole penis becomes of a dusky-red color, and the appearances presented are those of a very actively destructive subpreputial inflammation. This condition is in striking contrast with the cold, rather unprogressive, course of phimosis from hard chancres. In many cases of chancroidal phimosis there is a complicating chancroidal bubo in the groin.

Fig. 115.



Chancroidal phimosis with Indian-club-shaped penis and destruction of the distal part of the prepuce.

Chancroidal Paraphimosis.—This is a rather rare affection, and is quite rebellious to treatment. Chancroidal paraphimosis is usually developed in cases of chancroidal phimosis by the violent retraction of the prepuce, which then cannot be pushed forward. The case then becomes one of paraphimosis complicated by chancroidal ulcers and much œdema.

INFLAMMATORY AND CHANCROIDAL BUBOES.

Seeing that the majority of inflammatory buboes are due to chancroids and to mild ulcerative lesions of the genitals and anal region, it is well to consider these two forms of abscess together in this place.

Undoubtedly, many mild inflammator[illegible] [illegible]nal

ganglia are the results of trifling irritation and suppurating processes on the toes, legs, scrotum, penis, and anal region. It may be that these local lesions are very mild and ephemeral, but in their short life they give off sufficient poisonous secretion to cause more or less inflammatory reaction in the crural and inguinal ganglia. Now, there may be in the regions just mentioned more severe inflammatory processes, in which the potentiality of the poisoning dose is greater, and, as a consequence there is true suppuration in the ganglia of the groin. Undoubtedly, a large proportion of the suppurating buboes which we see in dispensary and hospital practice is caused by genital and extragenital inflammatory lesions of which the patient can give little if any information.

In practice we find four well-marked varieties or gradations of inflammatory bubo, which are as follows:

1. Simple hyperplasia of one or more ganglia—mono-ganglionic and poly-ganglionic adenitis, which may be acute or chronic. These lesions are due to a mild irritative process which shows itself by enlargement of the inguinal ganglia and swelling of the parts, which may be of normal color or of a more or less deep red. Pain may or may not be present. In these cases spontaneous resolution may or may not occur. Not uncommonly the ganglia are left in a permanently phlegmasic or hyperplastic condition. In some instances these swellings run a chronic course, and later on break down and suppurate, in which conditions they were once called strumous buboes.

2. Suppuration of one or many ganglia and of the ambient connective tissue, while some ganglia still remain in a hyperplastic condition. In this mixed condition some of the ganglia have not been sufficiently disorganized to become the seat of suppuration, and they remain in a state of low inflammation which tends to prolong the life of the bubo. When one or more ganglia are the seat of suppuration, and others of hyperplasia, a red and painful swelling is found in the groin, and digital examination shows a combination of fluctuation, doughy sensation, and nodulation. This mixed form of bubo may be as large as an egg or even larger. In this form of bubo the morbid process just falls short of that which occurs in the suppurating bubo.

3. Suppuration of the whole mass of ganglia and the formation of an abscess-cavity. The true suppurating bubo shows itself by a round or oval red and painful swelling, which is much elevated and has an area of one to four inches or even larger, its long axis usually corresponding to the fold of the groin. In this form an abscess-cavity is soon formed and fluctuation is readily discovered.

All of the foregoing forms of bubo may be observed in cases of chancroid of the genitals and of ulcerative lesions of the legs and toes.

4. In contradistinction to these comparatively mild forms of bubo,

the true chancroidal or virulent bubo, which nowadays is quite rare, stands out with marked features. These virulent buboes are generally caused by pus from very active and destructive chancroids and from mixed chancres in which the initial lesion has become infected with chancroidal pus. The chancroidal bubo gives evidence from the first of an actively destructive process. The groin becomes red and swollen, and a perceptible tumor is soon developed. The skin becomes red, tense, and the seat of much pain. Redness gives place to a brownish-red tint, and then the swelling, which is considerably salient, presents decided fluctuation. The abscess either bursts from ulceration of the skin or it is incised. The roof of this cavity, which consists of thinned and inflamed skin, then promptly melts away and the typical chancroidal bubo-cavity is left. This cavity is usually deep; its base is anfractuous, covered with sloughy tissue of a dirty-brown color, over which is a layer of unhealthy pus. The edges of this ulcer (since it really is one) are of a deep-red, thickened, and decidedly undermined. When untreated this condition leads to serious destruction of the penis, and may threaten the integrity of the vessels of the groin.

Diagnosis.—In various stages the chancroid may be mistaken for herpes progenitalis, exulcerated balanitis, ulcerated fissures and abrasions, hard chancres, mucous patches, ulcerating syphilides, and epithelioma.

When a number of herpetic vesicles are grouped on the genitals with their polycyclic outline, their shallow and superficially ulcerated surface, with the history of antecedent pains, their diagnosis is easy. In cases in which there is much inflammation a doubt may exist; but while ulcerous herpes may extend deeper into the tissues, it does not, as a rule, like chancroid, extend peripherally by ulceration. Herpetic vesicles coalesce because they are so closely grouped; chancroids coalesce by peripheral extension and fusion with each other. A single herpetic vesicle may be mistaken for a chancroid, but observation of its course for a day or two will settle the question of its nature.

Exulcerated balanitis is commonly readily recognized. Its lesions begin in patches much larger than chancroidal ulcers, usually with a history of phimosis or of inattention to cleanliness, and their edges are not undermined, nor are their surfaces ulcerated or worm-eaten, but rather smooth and velvety.

Very frequently patients, particularly men, are much exercised over traumatic fissures and abrasions. When much inflammation is present a reserved diagnosis may be made; but cooling applications will cure the simple lesion, whereas the chancroid will be only slightly improved. Water dressings and time will make the diagnosis between a

lesion, a chancroid, or a hard chancre, the last of which these seemingly simple lesions often prove to be. This fact cannot be kept too prominently in mind.

Mucous patches may in a measure resemble chancroids if very much irritated, but it is an exceeding rarity to see them present the typical appearance of the chancroid. Usually their mode of development, size, situation, their well-marked salience, their configuration, peculiar color, and their coexistence with a history of syphilis or with syphilitic lesions point out their specific nature. It must be remembered that about the genitals of both sexes mucous patches and condylomata lata are often much irritated and give issue to an irritant pus which is auto-inoculable.

Prognosis.—In the majority of cases the prognosis of chancroids is good. When intelligent and efficient treatment is instituted early the affection is soon cured. If the lesion is superficial, it may be cured in a week or ten days. If the chancroid has extended deeply into the mucous membrane or skin, involving the lymphatics, the cure is effected slowly; but even in this class of cases healing ought to occur within a month. Old chancroids with much thickening of the skin may be still more rebellious. Carelessness of the patient, dissipated habits, and excessive physical exercise render a prognosis less positive and assuring.

When phimosis or paraphimosis is present the outlook is more grave, since, unless the patient can be put under perfect control on his back, the progress of the case will be inevitably bad, and may result in more or less loss of tissue or deformity of the penis, may be complicated by severe hemorrhage, or result in phagedena or gangrene. Lymphangitis and buboes may be produced, which may lay a patient up for a long time, besides entailing upon him suffering and misery. In such cases the immunity to systemic infection enjoyed by the patient is a source of much comfort to him. Chancroids of the meatus and urethra under unfavorable circumstances result in stricture.

In women the prognosis of chancroids is less favorable, even in mild cases, than in men. The difficulties of properly treating them, unless they will remain in bed under the care of a nurse or in a hospital, are very great. The conformation of their parts, the presence of normal and abnormal secretions, the setbacks caused by menstruation, and the difficulty of retaining properly the dressings—all tend to prolong the course of the ulcers. Further, women, as a rule, are not docile patients.

Phagedena and gangrene are usually not to be feared early in the course of these lesions. In private practice I have never seen them begin in an uncomplicated young chancroid, though in dispensaries and hospitals, and among the squalid poor and in drunkards, they may

sometimes be seen. There is usually, in these cases, a history of injudicious treatment, particularly of improper cauterization, an absence of treatment or inattention on the part of the patient, or of inaccessibility of the ulcers in consequence of complications, such as phimosis or paraphimosis.

Treatment.—The most efficient prophylactic measure is thorough cleansing of every fold and recess of the genitals. In the treatment of chancroid it is important to know what not to do—namely, *not to give mercury and treat the case as one of syphilis; not to cauterize injudiciously and indiscriminately; not to use ointments and fatty preparations;* and *never to resort to excision.* Nothing but harm can follow any of these procedures.

Cauterization of chancroids has for its object their destruction and transformation into simple lesions. To-day this treatment is not largely followed, owing to the tendency which has increased within the past fifteen years to limit it to certain cases. The agents now mostly used are nitric acid and carbolic acid.

It is of prime importance that patients suffering from chancroids should be kept as quiet as possible—that they should rest at every opportunity, should not attempt severe muscular exercise, nor walk, jump, dance, nor ride on horseback. Care should be taken that friction and compression of the penis be avoided. Alcoholics should be uncompromisingly interdicted, and plain digestible food taken.

The most rigid attention to cleanliness and to keeping the parts dry is necessary during the course of chancroids.

Destructive cauterization is only applicable for chancroids in the early stage and before the ulcers become complicated by much œdema. Before using it—in fact, before making any application to chancroids—the ulcers and the surrounding parts should be thoroughly cleansed with soap and water, and then well irrigated with a very warm or hot bichloride of mercury (1 : 2000 solution); or peroxid of hydrogen or a hot solution of boroformalin (1 to 3 per cent. in water), or a lysol solution of the same strength and temperature. No chancroid should be thus treated which cannot be thoroughly exposed and afterward carefully dressed. The technique of applying the acid—and in most cases liquid carbolic acid answers every purpose—is very simple. The surface of the ulcer must be carefully dried, after having been cocainized, and then the acid thoroughly applied by means of a bit of absorbent cotton wound around the end of a wooden toothpick. Care must be taken that the undermined edge is thoroughly touched, and that none of the liquid escapes on the surrounding parts.

When the chancroidal film of the floor of the ulcer is rather thick, it may be necessary to use the stronger caustic nitric acid, wl

done in the manner just indicated; but it is always well to apply first a 10 per cent. solution of muriate of cocaine. By this means the patient suffers no pain, and the surgeon may be more thorough in his application. There is no necessity for the use of a long glass stopper or of a glass rod in applying nitric acid, since it can be done much more perfectly with absorbent cotton on the end of a wooden toothpick. It is usually well for a few hours after these caustic applications to apply water dressing or lead-water on lint.

Formalin in watery solutions (10 to 40 per cent.), sparingly used once or twice a day on a swab of absorbent cotton, is a very useful remedy in sloughing chancroids and in open chancroidal buboes. The parts are then dried and one of the powders mentioned later may be dusted over the surface, which is to be covered with sterilized gauze.

The actual cautery and Paquelin's thermocautery are very efficient destructive agents, but their use is greatly restricted in consequence of the dread inspired in the mind of the patient by them. Though the parts may be thoroughly benumbed by cocaine, few persons can avoid shrinking when they see the incandescent wire or cauterizer.

A word of warning is necessary against the use of the stick nitrate of silver, which, unfortunately, is largely used by the laity and many physicians, not only for chancroids, but also for simple fissures, erosions, and herpetic vesicles. This agent irritates, while it does not destroy; it intensifies the patient's sufferings, obscures the nature of the lesion, rendering diagnosis impossible, and produces so much inflammatory œdema in the lesion and around it that it is frequently mistaken for a hard chancre. Its use is to be emphatically condemned.

Treatment Subsequent to Cauterization.—Such is the superficial action of carbolic acid when delicately applied that under proper conditions no inflammatory reaction is to be feared. With nitric acid, on the contrary, unless temporary water or lead-water dressings are used, there is danger of producing subchancroidal and circumferential œdema and cell-infiltration. This is a complication much to be avoided, since it inevitably retards the cure. It is also very necessary in any case in which several chancroids—or even one of large size—have been cauterized that the patient should remain in the recumbent position from a half to a whole day.

For chancroids upon the glans and prepuce and in the vulva the interposition of pledgets of lint, sterilized gauze, or absorbent cotton is necessary. Whatever application is used, it should be changed at short intervals and directly destroyed, preferably by fire. Care must be exercised that the parts be not wounded in changing dressings. In addition, patients should be instructed to wash very carefully the parts, using a little tuft of absorbent cotton with soap and warm water, and

then thoroughly immerse them in a sublimate solution (1 : 2000). For women too much insistence upon cleanliness is not possible, since they, even the most cleanly of them, are liable to be derelict. They should be instructed to irrigate thoroughly and copiously the vagina several times daily with a mild and hot alkaline solution (borax or supercarbonate of sodium, ℥ss, to water, one quart), followed by a hot solution of sublimate (1 : 5000).

The most efficient all-round application to chancroids is iodoform, since it is an undoubted promoter of healthy granulations and a local sedative. It should only be employed in the form of an impalpable powder, either pure or in combination with some bland and absorbent powder, such as subnitrate of bismuth, starch, magnesia, boracic acid, or powdered sugar of milk. Its odor is its great drawback, but even in private practice the expedients of the patient or surgeon may be such that its use does not compromise the former. Various essential oils are mixed with it, but, after all, coumarin, the active principle of Tonka beans, is yet the best disguise. Powdered roasted coffee also is good. When used in powder form the ulcerated surface should be freely but not copiously dusted with it, and over it a thickness of perfumed lint or absorbent cotton may be placed. It may be employed suspended in sulphuric ether (ʒss–ʒj to ℥j) or in similar proportions in glycerin, ʒij, water, ʒvj.

It is important to remember that the action of iodoform is that of producing healthy granulations, and that when this has been effected its use should be suspended, since upon granulating surfaces it often acts by impeding healing. Further, from these surfaces it is liable to be absorbed and produce toxic effects upon the skin and system at large. The conclusion, therefore, warranted is that the *use of iodoform should be suspended when chancroids take on a granulating surface.*

While, in general, iodoform is indicated in persistently ulcerating and chronic chancroids, we have several valuable drugs for application in less severe cases, namely: aristol, europhen, antinosine, nosophen, resorcin, and acetanilid. With these remedies we can keep the surface of the ulcers very dry, and in the treatment of chancroids the dryer we can keep the surfaces the more rapid is their healing. It must be borne in mind, however, that it is well to irrigate these ulcers at least once each day, and then to dry them carefully with sterilized gauze.

In the cicatrizing or reparative stage of chancroids, not earlier, much progress is often made by judicious applications of a solution of nitrate of silver, 10 to 20 grains to the ounce, made every few days. The parts are prepared by careful irrigation, then they are dried, and the solution is carefully and sparingly applied.

Curetting of chancroids is of benefit, and is in

are old and the seat of much condensed œdema. It is also beneficial in cases of serpiginous chancroid. The parts to be operated on are rendered as clean as possible, then thoroughly cocainized and curetted, care being taken that from the whole surface and the edges of the ulcer all the diseased tissue and detritus are removed.

It may be well to remember that in some cases the final healing of chancroids may be brought about by solutions of sulphate of zinc, by aromatic wine, and diluted solution of chlorinate of sodiuum.

The seat of chancroids materially modifies the method of treatment. For lesions under the prepuce dry powders may be used, and great care must be taken to avoid œdema, which brings in its train phimosis and paraphimosis, two very annoying and serious complications. On the integument it is often difficult to keep dry powders on the ulcers, in which case watery applications may be used, or powders covered over with lint, cotton, or gauze moistened with water.

At the frænum chancroids are prone to become the seat of œdema, to hemorrhage, to eat through the base of the bridle itself. Therefore they require especial care, particularly as œdema in this region is always followed by phimosis, even if the prepuce is ample.

Chancroids at the margin of or within the urethra must also be carefully treated, and it is well to avoid cauterization, since it is so liable to produce œdema, to cause the ulcers to become more active, and even to result in stricture.

If the chancroids are just at the lips of the meatus, they should be well irrigated with a hot bichloride solution (1 : 2000) or carbolic acid solution (1 : 250 to 1 : 500). After drying, the parts should be covered with iodoform or aristol, and then well bandaged with a mass of absorbent cotton carefully retained.

If the chancroids are about an inch down the urethra, the parts should be first irrigated with the solutions just mentioned. Then a No. 12 French catheter, cut off at a length of four inches and lubricated with glycerin, should be passed into the urethra beyond the ulcers, and then by attachment with an irrigator fully a quart of the antiseptic solutions mentioned should be retrojected. Then iodoform or aristol is insufflated into the urethra, which is packed with absorbent cotton.

Chancroids under the prepuce must be treated after the manner of phimosis plus that of destructive ulceration. Subpreputial injections of hot (1 : 2000) sublimate solution should be used very often, taking care to get the irrigating liquid well behind the glans. Then iodoform suspended in glycerin and water should be introduced. It is better in all cases to anticipate gangrene, and if the progress in treatment is not perfectly satisfactory to treat the case surgically.

Chancroids in women demand the utmost attention to cleanliness,

much prudence and care in cauterization, and thorough and frequent dressings. Their surfaces should be kept free from discharges, and all coapting parts should be separated. In like manner, chancroids of the anus must not be injudiciously cauterized; they should be carefully dressed, the parts being separated. Attention should be paid that the stools be rendered liquid in consistence.

Since the era of violent and indiscriminate cauterization has departed and iodoform has come into use, the ravages of serpiginous chancroids, phagedena, and gangrene are much less common and less severe than formerly.

The treatment of serpiginous chancroids should be both local and general. Wherever there is debility it is to be combated with nutritious food, tonics, and, if necessary, stimulants. Locally, after prolonged immersions of the parts in water as hot as can be borne and irrigations with 1 : 2000 hot sublimate solutions, the surface may be touched with nitric acid or bromide and glycerin (1 : 8), care being taken that the ulcerating furrow at the edge be thoroughly touched. The whole may be temporarily covered with lint or absorbent cotton moistened with dilute Labarraque's solution, 1 : 10 of water. After this, iodoform may be applied quite freely, and the whole surface covered with absorbent or iodoform gauze, over which is a layer of gutta-percha tissue. While this treatment is usually successful, cases do occur which tax the resources of the surgeon and call in play all manner of therapeutical expedients in the way of remedies and methods of application. In some cases the systematic use of the curette, particularly at the margin of the ulcer, produces good results.

Phagedenic chancroids require the most careful attention to diet, hygiene, and surroundings. The vital powers must be sustained by tonics and stimulants, and opium must be given to relieve the pain and quiet the nervous anxiety of the sufferer. The next essential is to determine whether syphilis is a factor in the process, since in proportion as that diathesis is active in such case so is mercury beneficial, whereas it is positively injurious in simple phagedenic chancroids. In this complication the dermal curette may be employed with benefit to remove débris of tissue, sloughs, and pultaceous matter from the surface and edges. Then the whole surface may be thoroughly but carefully touched with nitric acid, with the bromine solution (1 : 3) of glycerin, or with the actual cautery, care being exercised that the surrounding parts are not injured. Phagedena complicating chancroidal phimosis necessitates incisions sufficiently extensive to allow the parts to be reached. In addition to this direct medication, the most important measure is the immersion of the parts or [illegible] in a hot sitz-bath (98° to 102° F.) for from eigh[illegible]

being taken that the comfort of the patient is attended to in every particular.

Where the phagedena attacks the distal portion of the penis copious irrigations of hot water or of hot sublimate solution (1 : 2000) by means of a spray syringe for several hours a day, have proved very efficacious in my hands. When healthy granulations appear the surfaces may be dressed with balsam of Peru and covered with sterilized gauze.

TREATMENT OF CHANCROIDAL PHIMOSIS.—In the treatment of chancroidal phimosis, and of the phimosis which sometimes complicates

FIG. 116.

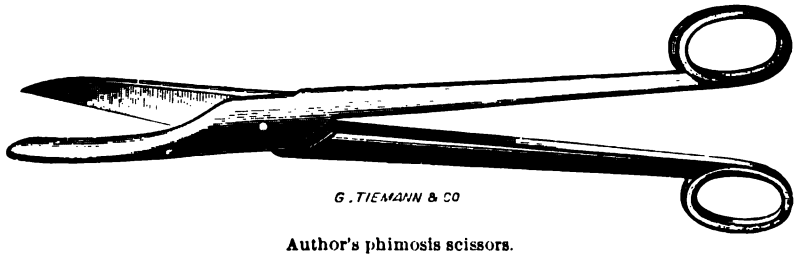
Chancroidal phimosis, showing the results of the dorsal incision.

hard chancres, the great bugbear in the past has been the fear of infecting the incised surfaces. This fear has led to delay, to the use of inefficient methods of treatment, and in many cases to the destruction of large portions of the penis. Such a fear is entirely groundless, since the truth is, that when properly treated by incision these cases begin to improve at once, and in the end come out well. The rule, therefore, in these cases should be that when such tentative

measures as hot antiseptic injections and immersions in hot borax and carbolic solution have failed, and it is evident that the subpreputial lesions are inaccessible to treatment, even before evidences of perforation of the prepuce are to be seen, the parts should be thoroughly incised, so that they may be inspected at will and properly treated.

The old operation for these conditions was the dorsal incision, which in almost every case utterly fails to give the expected relief. This dorsal incision, even if sufficiently long, in most instances gives access to only the most prominent portion of the glans penis, while the fossæ of the frænum and the coronal sulcus are inaccessible or become so in a day or two after the operation. When the dorsal incision is made in most cases the condition of affairs portrayed from life in Fig. 116 confronts the surgeon, in which, though a long cut has been made, the ulcerations are inaccessible to his inspection and treatment. I am convinced that the only efficient operation is the one devised by myself many years ago. This operation is simplicity itself, and consists of two lateral incisions of the prepuce. Prior to the operation, the parts having been thoroughly cocainized, the preputial sac or cavity should be thoroughly irrigated with carbolic solution (2 per cent.) or sublimate solution (1 : 2000); the hairy parts must be shaved and the genital region rendered as nearly aseptic as possible. It is necessary to remember that in this form of phimosis the prepuce becomes very much elongated by reason of the inflammatory œdema, and that in most cases the glans becomes retracted, probably pushed back, by the closeness of investment of the thickened and

Fig. 117.



Author's phimosis scissors.

inflamed prepuce. The penis being held in the line of the thighs by an assistant, the patient being on his back, the surgeon introduces the lower or flat blade of my phimosis scissors (see Fig. 117, which resemble the plaster-of-Paris scissors) well back to the bottom of the coronal sulcus on one side, exactly in the median line. The scissors must be held firmly, and some force may be necessary to bring the blades together, for the tissues are usually very hard and brawny and show a tendency to resist and slip from the blades; so that if the incision is not sufficiently deep to render the coronal sulcus visible and accessible, it must be lengthened.

This being done, the same care as to symmetry and to being in the median lateral line is observed in the incision on the other side. The surgeon then has full access to the whole of the glans, the sulcus, frænal fossæ, and the inner layer of the prepuce. This is shown in Fig. 118, in which the glans is seen to resemble somewhat a bone-stump, and the prepuce the two flaps, in a case of amputation in the continuity of a limb. During the operation the parts, and the surgeon's hand as well, should be continuously irrigated with hot bichloride solution (1 : 2000). All morbid débris should be removed by means of the curette, and the ulcers should be made as clean as possible.

Fig. 118.

Chancroidal phimosis, showing the long flaps held back and the complete exposure of the inner surface of the prepuce and the whole of the glans penis.

In most cases it is well to turn the flaps back upon the penis, and there keep them under the pressure of the dressing, which should be wet bichloride gauze (1 : 5000). This dressing, besides encircling the penis, should be placed between the cut surfaces on each side. This dressing may be removed in about twelve hours, when the parts should be irrigated and then dusted with iodoform or aristol, gauze again placed between the flaps, and a gauze bandage applied around the distal part of the penis as firmly as can be borne. Usually the dressing should be renewed daily after very copious irrigation. The ulcerated lesions will begin to improve at once. If gangrene or phagedena has been present, either of these processes will be promptly arrested, and the raw surfaces will give no trouble. The period of healing varies in different cases, but in general its length is two or three weeks. When the parts have healed the flaps will be found to be remarkably short considering their previous length. The top one may be simply a small truncated cone, which can be readily cut off by a straight incision, or, if it is thickened, the parts may be cut out by two elliptical incisions, which should be continued down fully half an inch or deeper, in order to remove redundant inflammatory tissue. In the same way the under flap must be treated by incisions in elliptical or curved lines, carried well down to remove the redundant tissue. It

may be stated, as a rule, in these cases, that a wedge-shaped mass must be removed from the lower flap, and this incision should be in keeping with the conformation of the parts. The edges of the flap-wounds are then brought together with silk sutures and the parts antiseptically dressed. Usually healing is prompt, and in the end a very good result is obtained. This lateral-flap operation is really one of circumcision in two stages. When there has been much destruction of the prepuce and glans the symmetry of the parts is correspondingly impaired. It is wonderful, however, to see in some cases in which there has been much loss of tissue how lavish Nature is in her process of repair.

It may be well to warn young practitioners never to perform full circumcision in cases of chancroidal phimosis.

TREATMENT OF CHANCROIDAL PARAPHIMOSIS.—Chancroidal paraphimosis requires as the first essential in treatment frequent irrigations of the penis with hot 2 per cent. carbolic solution or 1 : 2000 hot sublimate solution. These irrigations should be long continued and thorough. In addition, the penis should be immersed several times a day in these solutions. Seeing that early reduction of the parts would lead to phimosis, it is well to take especial care that the ulcers are promptly healed. Iodoform, kept in place by gauze or absorbent cotton, may be very effective. It is well to refrain from cutting if possible; but if the constriction tends to produce strangulation, the encircling band at the bottom of the sulcus must be cut as directed in the section on Paraphimosis. (See page 000.) As a dressing the bichloride solution (1 : 2000) also may be very beneficial. But in every case most reliance may be placed on the irrigations and immersions. In all cases, even of simple paraphimosis, in which there is tendency to ulceration or gangrene these antiseptic measures should also be adopted. Chancroidal paraphimosis very often leads to deformity of the penis, for which partial ablation of the prepuce or circumcision may be necessary.

In the treatment of paraphimosis due to hard chancres it is first necessary to reduce the hyperæmia by immersions of the organ in very hot water; then the penis may be bandaged quite firmly with lint soaked in black wash. As the process of involution occurs a plaster of mercurial ointment may be bandaged around the penis. This application, together with constitutional treatment, will cause resolution in most cases.

TREATMENT OF BUBOES.—Simple hyperplasia of the inguinal ganglia, the first form of bubo, may disappear by resolution. When there are much heat and swelling cold applications, such as the ice-bag, carefully used, lead-and-opium wash, and lead and muriate of ammonium wash, may cause a subsidence of the process. In some

cases a fist-sized mass of sterilized gauze may be firmly bandaged over the tumor and kept continuously wet with bichloride solution (1 : 2000). Compression by means of a compressed sponge of absorbent cotton held firmly in place by a spica bandage of absorbent gauze sometimes produces excellent results. In some cases the daily application of tincture of iodine, combined with pressure, will effect a cure. Whenever the patient is particularly anxious for the speedy resolution of the swellings cantharidal collodion may be painted over them, and the resulting blister should be kept open for several days. This treatment, aided by the recumbent position, is sometimes very effective.

When abortive measures fail in some cases of inguinal ganglionic hyperplasia it is well not to temporize, but to resort at once to the radical operation of total extirpation. The operative field is shaved and rendered surgically clean ; then a long, free incision is made parallel with Poupart's ligament and over the most prominent part of the swelling. It may be necessary also to make a vertical incision in order to have more space to work in. This vertical incision may be of advantage in drainage. In some cases the nature of the tumor may suggest the propriety of making a curved or crescentic incision either above or below Poupart's ligament. In other cases it may be well to make a vertical incision for drainage purposes.

When the parts are exposed, all the glands, even if seemingly healthy, are to be dissected out. In this operation the surgeon may have to go down to and even between the femoral vessels. He should therefore work slowly and cautiously. Tissues should never be violently torn. The ganglia will be found to be firm oval masses as large as a bean and larger, and will be readily recognized when the operator has become familiar with the operation. All bleeding vessels must be tied.

In many cases, if great care is exercised in the matter of antisepsis, a clean wound is produced and its edges may be sutured (interrupted) by gut. It may be well in some cases to place in the most dependent part of the wound a narrow strip of sterilized gutta-percha tissue, in order to facilitate drainage. In those cases in which the integument is much inflamed and infiltrated it may be best to pack the wound with sterilized gauze and allow it to granulate, or to put in only a few sutures. The parts then should be well bandaged (spica) with sterilized absorbent cotton and gauze. By this procedure primary union may be obtained, in which event the detention-time of the patient in bed is materially shortened.

The treatment of the second form of bubo, which is practically an abscess-cavity in which many swollen ganglia remain in an indolent condition, is precisely that just detailed. In these cases we should aim to get primary union by the thorough removal of all glands

and of any portions of skin which may have been infected. Further than this the wound-cavity must be thoroughly and continuously irrigated during operation with hot saline solution, after which the skin flaps are brought together in the manner described (*vide supra*). The parts after being well washed with peroxide of hydrogen are to be freely irrigated with bichloride solution (1 : 2000), and by means of a curette every removable particle of morbid tissue should be scraped off, great care being exercised not to wound the vessels. The aim is to produce as nearly as possible a clean wound-cavity. The parts are then stuffed with iodoform gauze and firmly bandaged. In these cases it is well to remove the dressings every day and thoroughly irrigate the cavity, and again pack it and bandage the parts. Later on balsam of Peru gauze may materially hasten the healing process.

In many of these cases it will be evident to the surgeon that he cannot hope for primary union. He then resorts to packing the wound-cavity with iodoform gauze, and firmly bandages the parts. The frequency of renewal of the dressing will be indicated by the progress of the case. After a few days of this treatment the cavity may be packed with balsam of Peru gauze.

For all suppurating buboes and for some chancroidal buboes the following treatment is more efficient and productive of quick healing:

1. The operative field is shaved and rendered surgically clean. 2. A few drops of an 8 per cent. cocaine solution are injected beneath the skin where the puncture is to be made. 3. A straight, sharp-pointed bistoury is thrust well into the most prominent part of the mass until pus flows. 4. All of the pus is forced out through this opening by firm but gentle pressure, as this procedure is, as as a rule, very painful. 5. The abscess-cavity is irrigated with pure peroxide of hydrogen until it returns practically clear. 6. It is then irrigated with 1 : 5000 bichloride-of-mercury solution, all of which is carefully squeezed out. 7. The now thoroughly cleansed abscess-cavity is completely filled with 10 per cent. iodoform ointment by means of an ordinary conical glass syringe previously warmed in hot water, and a finger held over the puncture until—8. A cold wet bichloride dressing is applied with a fairly firm spica bandage. The cold congeals the ointment at the puncture, and thus prevents its escape into the dressing.

The patient should be kept very quiet for the first twenty-four to forty-eight hours, in bed if possible, although this is not absolutely necessary.

The dressing should be changed at the end of three or four days. It is not often necessary to repeat the processes of irrigation, cleansing, and injection.

Though it has been claimed that buboes are cured by this method

in six or eight days, the time occupied is usually between ten and twenty-one, which may be said to be an excellent showing. Besides this advantage, there is no necessity for painful applications or dressings, and the scar left is usually so small that it is necessary to look for it very closely in order to find it.

The treatment of well-advanced chancroidal bubo requires great care and the free use of antiseptics. If perforation of the skin has not yet occurred, the treatment just detailed may be employed perhaps with beneficial results. When perforation has occurred an oblique incision through the length of the tumor should be made; and if a pocket should exist pointing to the groin, a vertical incision is necessary.

CHAPTER XXIV.

SYPHILIS.

NATURE, COURSE, AND PROGNOSIS.

SYPHILIS is a chronic infectious disease which begins in a local lesion, which lesion is caused by some morbid secretion or virus or the blood derived from a previously syphilitic person. Beginning thus as a local infection, it promptly invades the whole organism, more especially its connective tissue, induces inflammatory processes of a low grade, and gives rise to a low form of cell-growth called granulation-tissue. Syphilitic inflammation, when uncomplicated, does not produce pus. It is therefore a chronic granulation-tissue disease of protracted and irregularly intermittent course, which in some respects resembles leprosy and tuberculosis,.

Syphilis pursues a **course** peculiar to itself. In its early stages it presents points of resemblance in its evolution and course to the exanthemata and to diphtheria, but here, again, many features are absent which are necessary to make the simile complete. Syphilis originates in a fixed and visible infectious secretion; the exanthemata likewise originate in a volatile or fixed infection; they have periods of incubation—syphilis two, the exanthemata one—which are followed by constitutional disturbance and fever, syphilis in these features being comparatively mild. Further, they all have extensive integumentary and mucous-membrane lesions, which in the exanthemata are inflammatory during their whole course, while in syphilis they are moderately hyperæmic and essentially proliferative. In diphtheria there is a demonstrable micro-organism which attacks the system in one spot, usually the throat, and exceptionally in other regions. From this local infective focus general constitutional symptoms are developed, such as fever, headache, pains in bones and joints, neuralgias, paralyses, albuminuria, and, in some cases, generalized exanthemata. Thus syphilis resembles diphtheria in its local origin, its systemic poisoning, its peripheral paralyses, its infectious nephritis, and its dermal rashes.

Syphilis is a disease of such protean aspects that in some of its very numerous phases it presents points of resemblance more or less strong to almost every other morbid condition or disease. Indeed, the metamorphoses of syphilis are infinite. Reasoning analogically, with the features and pathological nature of leprosy, tuberculosis, the exan-

themata, and diphtheria in mind, one is forcibly impressed with the view that syphilis also is a disease of microbic origin; but, striking as is the probability, the facts in our possession to-day do not warrant us to go as far as some authors do who unhesitatingly call syphilis a disease of bacterial origin. A number of observers have found in active and early syphilitic lesions certain micro-organisms which have been revealed by delicate staining-methods, but their numbers have been small, their presence not absolutely constant, and, furthermore, no cultures have been made, and consequently inoculation-experiments have not been tried.

In the wide range of infectious diseases we uniformly observe local symptoms due to the microbes, and general symptoms resulting from intoxication produced by the poisonous secretions or toxins developed by them, and various and varied tissue-changes. Now, in syphilis it is very probable that the initial lesion with its tissue peculiarities is the result of the action of certain specific virulent microbes. With the development of the lesion it is, reasoning on analogical evidence, not doing violence to probability to suppose that from this original infectious focus a diffusible poison is proliferated which gives rise to such fugitive and ephemeral affections (usually irritative) as meningeal hyperæmia, disturbances of the reflexes, erythematous rashes, icterus, and pains in the muscles, bones, joints, and fasciæ. The fever, the debility, the nervous disturbances, the anæmia and chlorosis from malnutrition, and the underlying changes in the blood, diminution in the proportion of its solid elements and the increase in the number of leucocytes—all these point to the existence of an intense microbic poison which has been diffused throughout the system. Superadded to these constitutional manifestations are the many cell-changes to which syphilis always gives rise. In the present state of knowledge we can only explain these complex morbid conditions and processes—since they resemble very closely, and even exactly, similar ones in other diseases in which the existence of a bacterium is absolutely certain—by assuming that they are the result of a *virus animatum* the micro-organism of which is unknown to us.

Whatever may be its origin, syphilis is a disease *sui generis*, which stands out prominently in pathology as a distinct succession of correlated morbid processes which may resemble many or all other morbid processes and diseases in part or in whole, but which is essentially different from them all. There is no etiological relation whatever between syphilis and chancroid.

There are two clearly defined forms of syphilitic infection—the one called the acquired form, which begins in a local or primary lesion, the hard chancre; and the other the hereditary, incorrectly called the con-

genital, form, in which there is no local primary lesion, the disease usually beginning with general manifestations. In the acquired form the infection is derived from a person previously infected in whom the disease is active. In the majority of cases syphilis is contracted in the sexual act, and for this reason this disease is classed among the venereal diseases. It is then syphilis of genital origin. There are, however, many instances in which syphilis is not contracted in coitus—for example, from kissing a syphilitic, by inoculation in operations upon and examinations of syphilitics, and from contamination from any article which by some means or accident may be smeared with the syphilitic virus. These latter forms, in which the infecting lesion is seated on other sites than the genital organs, are termed cases of extragenital syphilis, and from the fact that in most instances there is no moral transgression or erotic origin in their causation, they are classed under the category of *syphilis insontium*, syphilis of the innocents or unmerited syphilis.

Acquired syphilis is never developed spontaneously : its virus enters the organism at the point of infection, and always begins with the development of a local lesion called the chancre, the hard or Hunterian chancre, the infecting chancre, the initial sclerosis, the initial lesion, the primitive neoplasm, and the primary lesion.

Syphilis, therefore, is communicated to the healthy person by means of the diseased secretions of a person suffering from that disease, and the first evidence of the infection is shown in the initial lesion. Mankind alone seems susceptible to the action of the syphilitic virus, since experiments upon animals have clearly shown that they are immune to it.

Hereditary syphilis is that form in which the infection is derived from one or both parents who are the victims of an active state of the disease at the time of conception. It is very doubtful whether true syphilis can be transmitted to the child during gestation, particularly at its late period.

For purposes of clinical description and for various therapeutic considerations it is well to preserve Ricord's division of the disease into three periods—the primary, the secondary, and the tertiary. The primary period or stage of syphilis is divided into two parts, called periods of incubation. The first period of incubation is the time which elapses between the infecting coitus or contamination and the appearance of the hard chancre. The second period of incubation includes the intervals of time between the appearance of the initial lesion or chancre and the evolution of secondary manifestations. The secondary stage occupies the first year or two, in which the lesions are generalized, rather superficially seated, and of tolerably mild nature and course. The tertiary

stage begins at the expiration of two years, and perhaps in some cases earlier, and is peculiar in the fact that its lesions are, as a rule, more localized and circumscribed, but are deeper seated and of a more severe character.

Though this division is oftentimes chronologically incorrect, and though anatomically there are many exceptions to it, it is the best we have, and it can be put to a good purpose as a working clinical basis when its shortcomings are clearly known. Ricord's division assumes a uniform methodical and progressive course and development of the disease, which, however, may be observed in some cases and are wanting in others.

In many cases the secondary stage is quite regular and the morbid processes develop superficially and in mild form. Then in due time (the disease for any reason being progressive) tertiary symptoms show themselves, and we have an orderly and tolerably systematic evolution of syphilis from the primary through the secondary to the tertiary stage. But in many cases there is a want of uniformity of evolution, for lesions of a tertiary character appear precociously ; they may coexist with secondary lesions, and not infrequently after the precocious appearance of tertiary lesions those of the secondary period show themselves. While, therefore, it is often impossible to draw sharp lines of distinction between a secondary and a tertiary stage, we can hold fast in most cases to the following course in our clinical studies and in regulating our therapeutics—namely, to consider superficial lesions of the skin and mucous membranes and various systemic symptoms and conditions known to be of early development as evidences of the secondary period and indicating an appropriate treatment, and to look upon deep-seated lesions of the connective tissues and those of bones and viscera as belonging to the tertiary period and requiring treatment for advanced stages.

The mode of development of syphilis in its primary period is peculiarly precise and slow, is unattended with striking features, and is nearly always quite regular in its course and chronology, so that tolerably clear lines may be laid down concerning it.

The primary stage of syphilis begins with the act of infection, in which the virus is deposited upon some portion of the body, genital or extragenital. In the vast majority of cases no evidences of this accident is seen, and, owing to various causes, such as promiscuousness of sexual contact, indifference, and failure of memory, in many cases no precise data can be obtained concerning it. From the date of infection a period of time elapses before any visible manifestation of syphilis shows itself, which is called *the first period of incubation.* Clinical observations and experimental inoculations enable us to say that the dura-

tion of this period may be, in very exceptional cases, as short as ten days and as long as seventy days. I myself have seen undoubted instances of sixty and seventy days' primary incubation. In general, however, the average will be found to be between twelve or fifteen and twenty-one days. At the expiration of this time the hard chancre or initial lesion of syphilis shows itself.

It must be remembered that there is no haphazard about the development of the chancre, since the disease always begins at the infected part, which is commonly the genital organs. In somewhat rare cases two parts of the body may be infected at the same time. Thus we may find the initial lesion of the penis not very infrequently coexistent with a similar lesion on the lip, the face, the finger, or other parts of the body.

With the appearance of the hard chancre *the second period of incubation of syphilis* begins, but not the secondary stage of the disease. This period is rather more regular than the first period of incubation, and lasts usually about forty or forty-five days, sometimes as long as sixty, and very exceptionally ninety days. Cases of longer incubation than just stated should be accepted with much reserve and the elements of fallibility carefully probed. The length of the secondary period of incubation may, to a certain extent, be modified by influences which may affect the circulation, such as heat and alcoholics. In general, in hot weather the end of the secondary period comes quite promptly, while in cold weather it may be delayed. In weakly, thin, and anæmic subjects the second period may be much prolonged. I recently waited for the evolution of secondary manifestations in a cadaverous young man for eighty-two days before they appeared. In the case of a man forty-three years old the first period of incubation was twenty-one days. On the forty-seventh day of the second period of incubation he was attacked with severe pleuropneumonia, which lasted thirty-one days, and on the day following severe general syphilitic manifestations showed themselves. In this case, therefore, the secondary period of incubation was seventy-eight days.

The morbid phenomena observed during this period of incubation are the development and growth of the initial lesion or chancre, and the enlargement of the inguinal ganglia in immediate anatomical connection, which becomes appreciable sometimes as early as the fifth day, but usually from the seventh to the tenth. In some cases there is an induration of the lymphatic vessels leading from the chancre to the ganglia. This lymphatic hyperplasia goes on slowly and painlessly until the ganglia become much enlarged. These two periods of incubation, the primary and the secondary, constitute the first or primary stage of syphilis, which may occupy in its evolution from sixty to ninety

days, rarely longer. The disease, then, may be said to have become fully developed, and at this date general systemic manifestations and symptoms appear which constitute what is called secondary syphilis.

With the expiration of the second period of incubation, or that of local manifestations, the *secondary stage of syphilis*—or, as it is called, *the stage of general or constitutional manifestations* or the condylomatous stage—begins. In this stage, as a rule, the lesions are superficial, and confined largely to the skin and mucous membrane, consisting of erythematous, papular, and pustular rashes. The duration of the secondary period of syphilis cannot be definitely stated, since it depends largely upon the condition of the constitution and the habits of the patient, and also upon the fidelity with which he follows treatment. In the vast majority of cases—certainly in those in which there is no organic trouble—syphilis proves a very tractable and curable disease, provided patients will follow treatment in a careful and systematic manner during a sufficient period of time. If this is done, the disease may end with the secondary stage, the patient thereafter remaining healthy.

Prognosis.—In many diseases of microbic origin the severity of the attack depends upon the activity and the quantity of the virus inoculated or received. When the microbes are derived from active and exuberant lesions they usually produce an intense disease in vulnerable subjects, but when the virus is attenuated or when the microbes are in a weakly state (involution-forms) then the resulting invasion is less severe. To these features offered by other infectious processes syphilis does not seem to present points of resemblance. In other words, we know nothing of the mildness or malignancy of the syphilitic virus, and extended clinical observations made by many authorities go to show that a virus which produces severe syphilis in one individual may produce only a mild form of the disease in another. Therefore, in syphilis it may be said without fear of contradiction that the potentiality of the poisonous dose is about the same whether it be derived from a severe case of syphilis, or from a mild one. In the light of our present knowledge it seems warrantable to state that there is a well-marked uniformity in the infectious quality of the virus, no matter from whom it may be derived, and that this poison may produce in some subjects a mild and in others a severe form of syphilis. It, therefore, logically follows that the benignity or severity of syphilis is very largely determined by the condition of the individual. The potency of the virus is about the same, whether it be derived from the initial lesion or secondary lesion or the blood.

Clinical observation clearly shows that in some patients, owing to partial immunity, the syphilitic poison meets with such resistance on

the part of the tissues that it makes but a slight impression, while in others a marked susceptibility to its action exists, and a more or less severe form of the disease is produced. It has been claimed that, from certain features observed in the chancre and during its course, we may draw prognostic points as to the mildness or severity of the subsequent course of the disease. It has been said that a small, slightly indurated chancre is usually followed by a mild attack of syphilis. This statement may apply to some cases, but certainly not to the majority. It is not uncommon to see all grades of severe syphilis follow an insignificant initial lesion which might have undergone involution in ten days or two weeks, and have left little, if any, trace upon the part attacked. It is very common to see severe and extensive syphilitic lesions in persons who never knew they had a chancre, and in whom it must have been very small. The truth is that both mild and severe grades of syphilis may follow small initial lesions. It has also been claimed that large and deep primary lesions invariably lead to severe forms of infection, but this statement is only partially true, since cases of mild syphilis occur which follow a very extensive chancre, and instances in which two or three parts of the body were the seat of chancres (penis, lip, and finger, or penis and lip, or other part) are not uncommon in which the course of the disease was not at all severe.

Ulceration, phagedena, and gangrene, attacking the initial lesion, have been claimed to be ominous signs of a severe attack of syphilis. Extended clinical observation shows that this assumption is not fully warranted. Destructive ulceration of any form or gangrene attacking the initial lesion is always the result of contamination with pyogenic microbes, usually caused by carelessness and uncleanliness and also by intemperate cauterization, and they are to be regarded as disquieting accidents and not as indices of the malignancy of the initial lesion or as forecasting a severe attack of syphilis. In some cases of phagedena and ulceration of the initial lesion a temporary condition of ill-health is produced, but careful treatment will soon remove this accidental complication. It is also claimed by some authors that extragenital chancres are the forerunners of severe syphilis. This view is certainly based on the observation of a few exceptional cases, and is not borne out by extended investigation. It not infrequently happens that the nature of an extragenital chancre is not recognized or that it runs its course unobserved by the patient. In such cases the resulting syphilis may not be treated, or it may be improperly treated, and then a severe attack may result.

Fortunately for the human race, syphilis in the great majority of cases is contracted by young men and women between twenty and forty years of age in whom the vital processes are active and whose health, as

a rule, is good. Such patients are naturally capable of withstanding attacks of various diseases, but some are more resistant than others. According to my observations it may be said that syphilis is much less severe to-day than it was thirty years ago. We no longer, not even in large syphilitic clinics, see so many cases of malignant, of severe, and of malignant precocious syphilis, nor do we meet with the more profound and grave tertiary lesions by any means as frequently as we did a quarter of a century ago. This diminution in the severity of the disease is largely due to our improved methods of treatment, to better sanitary and nutritive conditions, and to the greater attention which is paid to cleanliness and antisepsis. But further than this, there undoubtedly exists to-day in the tissues of many individuals a greater resistance to syphilitic infection than was possessed years ago. In other words, in many people a moderate condition of immunity against syphilis exists, which is due to the changes in the tissues and perhaps in the blood induced by syphilis in their more or less remote ancestors.

In a general way it may be stated that the larger number of persons who contract syphilis are those who are in average good health and have not grown old. In a smaller number the standard of health is less high, and in many patients certain morbid conditions exist which are due either to disease or bad habits, and which lower their power of resistance. Syphilis when untreated by mercurials generally runs a quite uniform course, in which the early superficial lesions are followed by deeper and more severe manifestations. Its tendency, luckily for mankind, is to expend its force on the superfices of the body, and it seems very probable, particularly in healthy subjects, that the lesions of the deeper parts are, in the main, due to various determining causes, such as traumatisms (bones, joints, tendons, and fasciæ), antecedent pathologic processes (liver, spleen, kidneys, intestines, and testes), and to a neuropathic tendency (cerebrospinal affections). When any of the above-mentioned causes exist in untreated syphilis, the grave order of lesions may follow or coexist with the more superficial ones. Some of these mild cases, in persons previously healthy, sooner or later become grave, and even malignant; but in general the gravity or malignancy of syphilis is due to some inherent defect in the constitution of the patient, to some diseased condition, or to a lowered state of health due to privation or bad habits.

The pathology of early syphilis is revealed to us in the cell-infiltrations constituting the essential lesions which are distributed in a symmetrical manner over the whole body. With the evolution of this new growth a diffusible poison is developed, as we have already seen, which is carried throughout the entire system and gives rise to the various phenomena (fever, debility, emaciation, headaches, neuralgias, arthralgias,

periosteal pains, splenic engorgement, and sometimes pleuritis). In consequence of the destruction of the newly-formed cells by treatment the tangible lesions undergo involution and disappear, and in proportion to the completeness of their cure does the poison secreted by them grow less and less in potency and quantity. When a perfect cure does not take place, some of these morbid cells remain (in all probability in little masses around the bloodvessels, and not stored in the ganglia), but as they grow old they lose their vitality and increase slowly, and, having lost much of their virulency, produce very little, if any, of the diffusible poison. This is what takes place in tertiary syphilis, in which the new growths are indolent, aphlegmasic, and show a marked tendency to localization and to asymmetrical distribution. The gumma is the direct and feeble descendant of the virulent round-cell infiltration of the secondary stage of syphilis. Such, in brief, is the nature and extent of the syphilitic invasion, which, if unchecked, goes on more or less rapidly to produce tissue-change, to lower the standard of vitality, to attack organs whose integrity is essential to life and happiness, and to produce serious conditions, and even death.

Syphilis in healthy persons, male and female, as a rule, runs a mild course, and its poison is eliminated from the system if active treatment is instituted at the proper time. Much depends upon the intelligence and docility of the patient, who, if he enjoys ordinary good health and will follow up energetic, but very carefully directed, treatment, may, I am confident, be cured. This comforting assurance may be given to the majority of patients seen in private practice, who, in general, are intelligent, realize the gravity of their condition, and resolve so to conduct themselves and regulate their habits that their vital processes can resist the depressing influences of the syphilitic poison and be able to undergo the strain put upon them by long-continued medication. Thirty years' study and observation of the nature and treatment of syphilis has convinced me that in most cases a cure is possible, whereas, in years gone by, we groped in ignorance, pursued faulty, and even harmful, therapeutic methods, and never felt ourselves masters of this insidious and far-reaching infection.

Vigorous and intelligent treatment more or less promptly influences and attenuates the virulent infection, which will gradually subside, and in most cases in previously healthy persons a cure will result within two or three years, and in some cases much sooner. The mercury destroys the newly-formed and nascent cells, and as they die so does their poisonous power wane. In many cases we see no visible lesions or very simple ones after the first rash. Cases thus treated may be called mild, and in private practice it is the rule, when patients are intelligent and docile, and submit fully to treatment, to see this benign

course of syphilis. Such cases may, therefore, be taken as the standard of comparison with other forms of syphilis now to be considered.

There are many persons who, though not absolutely sick, are not really well. In this category are included cases of anæmia, flabby and poorly nourished individuals, blonds with light reddish hair, persons suffering with malnutrition, and even those who are mildly neurasthenic. Then again we observe cases in which the health is impaired by worry and grief, by business cares, doubts, dreads, and excitements, also by insomnia. All such may be said to suffer from lowered vitality, and in them syphilis is apt to run a more or less severe course. In the treatment of these cases we may not experience the quick response to the administration of mercurials; the manifestations may be rather slow in disappearing, and they may show a tendency to reappear. The cure, therefore, is not produced quite as quickly as in the benign cases; but although the case may hitch and halt, neither physician nor patient should falter. In America, syphilis in women runs about the same course that it does in men, but the female sex is much less frequently attacked by cerebral and cerebrospinal affections than are men. Women, as a rule, are less addicted to alcoholics than males, and they are not called upon to overtax the brain as many men are, consequently they present rather infrequently evidences of specific nervous affections.

Syphilis in the poor and ignorant is mild or severe, and sometimes malignant, in its course. Perhaps the greatest of all drawbacks in the treatment of syphilis in the poor is to establish in their minds a realizing sense of the gravity of the affection. Consequently, it is in these individuals that we often see the disease run a chronic and severe course. They are careless in following treatment, and, as a rule, cannot be induced to remain under medical care any length of time after the disappearance of the specific lesions or the cessation of their discomforts. This is the explanation of the severity and malignancy of syphilis among the lower orders of our population. Then, again, many poor people are addicted to alcoholics, which act harmfully upon them and render the course of syphilis severe and protracted. In this class of patients the food is very commonly inadequate in quantity, of poor quality, and among many (Italians, Poles, and Hebrews) fish and the starchy articles are eaten and very little, if any, animal food is used. The nutrition of these people is usually below par, and few of them possess that systemic resistance which holds them up when in the grip of syphilis. Then again there are other factors which tend to render syphilis severe in the lower classes. They are commonly uncleanly, and as a result the microbes of the skin act upon syphilitic lesions and induce in them ulceration and perhaps phagedena and gangrene. While in private practice it is very rare to see pustular eruptions, in the lower classes

these lesions are very common. Then, again, uncleanliness leads to the development of mucous patches and condylomata lata upon the vulva, anus, axillæ, umbilicus, and upon other parts, and these lesions aggravate and lengthen the course of the disease.

Severe forms of syphilis are observed in these patients in varying grades of intensity. As a rule, the secondary lesions are numerous and distributed symmetrically over the whole body, and the influence of the specific poison is severe (neuralgias, headaches, joint, bone, and muscular pains, etc.). One rash runs an indolent course and is soon followed by one of more severity which becomes complicated with pyogenic infection, and thus we come to see ecthyma, impetigo, and varioliform syphilides and rupia. In these cases there is more or less prostration and little reparative tendency, while in very severe cases fever, sometimes head symptoms, great emaciation, and even marasmus may exist. Then, again, in unhealthy persons, particularly in the lower orders, we may observe what is called precocious malignant syphilis, which is an entirely different condition from true malignant syphilis. Precocious malignant syphilis is noteworthy for the reason that it usually begins in the severer forms of the disease in which ulceration attacks the various lesions. Then while these degenerating secondary lesions are appearing, ulcerating, and cicatrizing, and old ones are being replaced by new lesions, gummatous infiltration, of the mouth, eye, subcutaneous tissues, bones, and joints, and the cerebrospinal system, may develop more or less extensively. Thus we see men covered with secondary lesions in whom tertiary lesions have appeared precociously, while at the same time the health is at a very low ebb, and there may be present aphasia, hemiplegia, coma, and other nervous disturbances. Such, briefly, is precocious malignant syphilis. In these cases, as a rule, want of treatment or imperfect treatment and impaired resistance to the virus, are the underlying cause of the serious course of the disease.

CHAPTER XXV.

COMPLICATIONS AND GENERAL CONSIDERATION OF SYPHILIS.

Malignant Syphilis.—Malignant syphilis is, undoubtedly, a rare and peculiar form of the infection. Its chief characteristic is that it is essentially a secondary syphilis and is in no way associated with tertiary syphilis. Patients thus affected show evidence of profound systemic poisoning in the high fever, loss of flesh, abject marasmus, insomnia, and pains in various parts of the body. There also may be present such grave symptoms as aphasia, epilepsy, coma, and paralyses. In these cases the nervous affections are not due to gummatous deposit, but rather to the round-cell infiltration around the vessels, chiefly of the membranes of the brain. The cutaneous lesions are at first erythematous and papular, with the general disposition, arrangement, multiplicity, etc., peculiar to the secondary period and without the localization and comparative sparseness of the lesions as observed in precocious malignant syphilis. These early manifestations very soon undergo degeneration and as a result goodly sized ulcers, rupia, large ulcerated plaques, and even gangrenous surfaces are produced. None of these lesions, except the rupia, resemble in their course tertiary syphilitic ulcers with their peculiar mode of increase and with their occasional tendency to become serpiginous. Malignant syphilis usually begins early in the secondary period, and very uncommonly later than the end of the first year of infection. This form of syphilis is very rare indeed, and in it a fatal issue is often observed. Its course may be protracted, so that a year may elapse before death occurs or a cure is effected. Malignant syphilis is due to the lack of resistance on the part of the individual to the severity of the infection. It seems that the poison meets in the tissues of the person attacked such a condition of receptivity that it is generated in large quantity and with a peculiar virulence which affects the whole organism.

In some cases there is evidence of impaired nutrition in persons thus attacked, but it is sometimes surprising to observe malignant syphilis in well-built, robust subjects of good habits. It seems that in spite of the vigor of their health these patients lack that something which constitutes what we term partial immunity to the syphilitic virus. In short, their tissues present fertile culture-grounds for the exuberant

growth of the syphilitic infection and the poison is produced in large quantities, while the cellular elements are much more sparsely proliferated.

Tertiary Syphilis.—The persistence of the syphilitic infection beyond the secondary period results in the production of a certain morbid state, the evolution of which is slow, uncertain, and often insidious, and the lesions of which are deeply seated in the subdermal connective tissue, mucous membranes, and other structures, and which is called tertiary syphilis. By far the most potent cause of tertiary syphilis is absence or insufficiency of treatment in the secondary stage. But in addition to this cause there are others which result from lowered nutrition and weak resistance on the part of the tissues. Then, again, certain diseased conditions, may act as secondary factors in the development of this late and erratic stage of syphilis.

Tuberculosis and Syphilis.—One of the most formidable complications of syphilis is tuberculosis, and it is only too clearly proved that tissues attacked by syphilis become perfect hot-beds for the fructification of the tubercle bacillus. This destructive and deadly symbiosis is seen in the secondary and in the tertiary periods. In early secondary syphilis, even when well treated and in seemingly healthy subjects, bronchitis or pneumonia may develop, and thereupon acute miliary tuberculosis may supervene and carry off the patient. Then, again, when syphilis runs a severe course, in some truly malignant cases, tuberculosis supervenes and quickly kills the patient. We also sometimes see men and women who are being properly treated and who toward the end of the first year of infection begin to lose weight and strength, and are attacked by pulmonary symptoms. Some of these cases are benefited and cured by change of climate and treatment, but many are promptly carried off by this virulent tuberculous complication. Gummatous infiltrations of any or all of the viscera are liable to be attacked by tuberculosis, and syphilitic sarcocele is not infrequently the seat of this secondary invasion. When considering the factors of gravity in syphilis, we unfortunately must accord to tuberculous infection a prominent place.

Alcoholism.—Chronic alcoholism is a powerful factor in inducing the development of severe and extensive lesions of the skin and mucous membranes, of cerebral disorders, of a debilitated condition of health, and causes the disease to run into its tertiary stage. It is then very chronic and visceral lesions are of frequent occurrence, and deeply seated infiltrations of the skin and mucous membranes develop, which show a marked tendency to soften and form abscesses and ulcers of great persistency. Alcoholism in the lower classes is, next in order to the absence of treatment, the most frequent cause of tertiary syphilis.

When arterial or visceral degeneration has not been produced and with the cessation of the alcoholic habit much encouragement may be given to such patients as to their ultimate cure, provided they will abstain from alcohol and systematically follow the treatment.

Malaria.—In malarial subjects the course of the disease is frequently severe, the condition of ill health is well marked, neuralgias are very frequent, and the specific lesions are copious and extensively distributed.

Albuminuria.—Bright's disease is a factor of much gravity in patients infected with syphilis, and in many cases its course is very severe. Then again, we sometimes see men and women who have advanced kidney degeneration in whom syphilis runs a surprisingly mild course. Uræmic subjects who contract syphilis are very commonly profoundly influenced by the infective process. Their lesions are extensive and show a tendency to ulceration, and the general depression of health is very marked.

Diabetes.—When in the course of syphilis specific brain lesions lead to glycosuria or diabetes insipidus, these grave constitutional conditions become factors in the production of a general breakdown of the system. The various morbid blood-states, such as scurvy, the hemorrhagic diathesis, and hemoglobinuria, are serious complications of syphilitic infection, and in patients suffering from them it is common to observe a severe course of the disease. Influenza is frequently seen to be the cause of great systemic depression, and it may become a factor of much gravity in syphilitic patients, in some of whom severe pulmonary affections occur.

Rheumatism and Gout.—Rheumatism and gout are not uncommon complications of serious import in syphilitic patients, in some of whom the specific lesions are materially modified by this harmful symbiosis. And in some cases syphilis seems to be a causative factor in the intensification and prolongation of these chronic disorders.

Acute Infectious Processes.—The debility following various infective processes, such as typhoid fever, diphtheria, erysipelas, and the exanthemata sometimes renders the course of syphilis severe for a long or short period. I have, however, in some cases, been astonished at the extreme mildness of secondary syphilis in patients who had a short time before infection recovered from erysipelas, typhoid fever, or diphtheria.

Syphilis in Old Age.—When it is remembered that syphilis expends its morbid action largely and extensively upon the bloodvessels, the fact strikes one that in old persons the severity of the attack is very much influenced by the condition of the vascular system. Upon the integrity of the patient's bloodvessels hinges in a large degree the varying severity of syphilis. In old persons arteriosclerosis is com-

mon, and may involve more or less of the circulatory apparatus. Instances of this involvement combined with syphilis are not at all uncommon. Besides vessel-changes, visceral lesions, general debility, an unstable condition of the tissues, and the systemic morbid effects produced by vicious habits and indulgences, are undoubtedly factors of gravity in syphilis in advanced life. A review of my clinical experience has convinced me that in many elderly persons of vigorous physique and good habits syphilis runs a comparatively mild course; in less vigorous persons it is more severe; and that in poorly nourished, weakly, and underweight individuals, in the nervous, excitable, neuropathic, and over-studious (brain-workers from all classes) it is often severe and even disastrous in its effects.

Early and efficient treatment, however, is most essential, and by it the course of the disease in the aged may be much modified, may be rendered mild, and in many cases a cure may result.

Many peculiarities in the course of many lesions are observed in aged syphilitics. In general the first period of incubation of the chancre is quite long. The initial lesion is not usually exuberantly large and indurated, but more commonly slight in character, parchment-like in thickness, with a tendency to superficial necrosis and sloughing. In some cases gangrene and phagedena are observed. The inguinal adenopathies usually appear and develop slowly, and the swollen ganglia are rarely, if ever, very large and nodular. The second period of incubation is also usually quite prolonged, so that two, two and a half, and even three months or longer may elapse between the appearance of the chancre and the onset of general manifestations. As Quinquaud says, "syphilis acquired after sixty years of age is a drama, the successive stages of which are slower in their evolution than those of syphilis acquired in early life."

Secondary lesions of the skin and mucous membrane do not present that amount of hyperæmia and exuberance which may be seen in the same affections in early life. The skin lesions may be generally distributed, and perhaps more or less confluent, but they always show more or less evidence of senectitude. This is especially well shown in the erythematous and papular syphilides. These lesions show a marked tendency to remain in an indolent condition, and are frequently very rebellious to treatment. They sometimes show an exasperating tendency to relapse even when a vigorous treatment is being followed.

It is not uncommon to see secondary and tertiary skin lesions commingled. Thus, roseola, papules, and gummatous nodules, the latter showing a tendency to break down and suppurate, may not uncommonly be seen scattered over the integument of elderly persons.

Malignant precocious lesions of the skin, bones, and mucous mem-

branes are not at all uncommon, some of which show a tendency to gangrene and necrosis.

Quite early in the secondary stage nervous and psychical troubles with paralysis are not uncommon, and headache, neuralgic and rheumatoid pains may also be complained of. Cerebral accidents, with symptoms resembling typhoid fever, may also be observed.

Gummatous infiltration into the ganglia not infrequently undergoes degeneration in old persons.

Another marked feature of syphilis in the aged is the multiplicity of the tissues and organs attacked at the same time, such as the skin, mucous membranes, bone, viscera, and the cerebrospinal axis.

It has been observed that after seventy years of age the pharynx is rarely attacked, that the brain and scalp are usually unaffected, and that the gums are more free from the effect of mercurials than in earlier years.

All these significant facts concerning syphilis contracted late in life should be clearly borne in mind, and a more than usual watchful care should be exercised over these venerable patients. It is well to emphasize the fact, however, that in some old persons of both sexes syphilis runs a tolerably mild course, and is measurably amenable to treatment. Consequently, it is not well always to give a gloomy prognosis in these cases.

On account of its rarity, the case reported by Cohn is interesting. It was that of a virile man who at eighty years of age contracted syphilis, which, though severe, was cured by specific treatment.

Cancer.—Syphilis is in no sense of the term an etiological factor in the development of cancer, but in some cases it acts as the forerunner and the predisposing cause of the latter disease by means of the chronic irritative processes which it establishes. As a rule, cancer consecutive to syphilitic processes develops in the mouth, particularly on the tongue and near its mucocutaneous junctions. It may also appear on the skin proper following certain chronic inflammatory syphilitic processes. As a result, a hybrid disease is produced, usually in the tertiary, and exceptionally in the late secondary, period of syphilis.

IMMUNITY TO SYPHILIS.

While in general it may be said that syphilis may attack any individual, there are some who possess a varying degree of immunity to this infection. As a rule, one attack of acquired syphilis confers immunity to subsequent infection.

Persons who in early life have been the subjects of inherited syphilis in the majority of cases are not susceptible to acquired infection. This has been called Profeta's law.

As a rule, a healthy mother who carries an embryo rendered syphilitic by its father is herself not liable to acquire syphilis. This statement is called Colles's law.

SYPHILOPHOBIA.

Syphilophobia is sometimes included among the manifestations of syphilis, but I do not believe that it is directly due to this disease. It is quite as often met with in patients affected only with gleet, prostatorrhœa, or who have nothing at all the matter with them except their own disordered imagination. Moreover, in truly syphilitic cases the fear of syphilis often increases in proportion as the specific symptoms disappear.

Syphilitic patients will sometimes state that they have resolved to give up their business and devote their time to the cure of their disease. Such a course should always be discouraged, since it favors mental depression, interferes with the general health, and thus retards the effect of remedies, and may lead to confirmed hypochondria or syphilophobia.

Fournier has recently laid stress on the occurrence of suicide in syphilitics. He divides these cases into four classes, as follows:

1. Cases in which the suicide is the result of a mental trouble arising directly from the syphilis; 2. Cases in which suicide is the result of despair of the patient, who has suffered from external syphilitic symptoms which are of a serious nature, or so considered by him; 3. Cases associated with the original announcement to the patient that he is syphilitic; 4. Cases depending on the social position, where syphilis has definite relations with marriage or social standing.

The first group includes those cases, the most numerous of all, where a mental trouble is directly the result of the syphilis, that is to say, syphilitic encephalitis, gumma of the brain, general paralysis of the insane, referable to the infection. In certain forms of syphilitic encephalitis suicide is a symptom, and at a very early period of the disease. It appears so suddenly that it overpowers the patient, who has been in a seemingly healthy condition. It may also develop after many years, and in cases of hereditary syphilis.

In the second class, where shame at contracting a venereal disease, or a disfiguring ulceration of the face, is present Fournier thinks that physicians should appreciate the special mental and moral attitude of their patients, so as not to be taken unaware by suicide from this cause.

In the third class, where suicide follows the first notification of syphilis, the fault lies in the abrupt, tactless announcement on the part of the physician to patients who are syphilophobiacs.

In America suicide in the third form of cases is most rare, but it is

well as advised by Fournier, particularly in nervous and impressionable individuals, to take time in making a positive diagnosis, and not to let it come to the patient like a thunderclap.

IGNORED SYPHILIS.

It is not uncommon in clinics and hospitals, and also, though less frequently, in private practice, to see cases of tertiary syphilis in which no history of primary or secondary lesions can be obtained even after rigorous cross-questioning. These cases are classed under the heading of "ignored syphilis" and under that of "syphilis occulta." As an example of the frequency of occurrence of ignored syphilis it may be mentioned that in a five months' service at the St. Louis Hospital, Fournier saw 28 cases, and that Lassar in 200 cases of late syphilis saw 60 (about 30 per cent.) in which no evidence of the early stages could be obtained.

Ignored syphilis is observed in women much more frequently than in men, and in ignorant and careless persons in the lower walks of life it is far from uncommon. Many women have but the most elementary ideas regarding syphilis, while men, as a rule, are quite well informed upon the subject. In many women the initial lesion is extragenitally seated, and its true nature and that of its sequelæ are never known to them. Then, again, by many women the genital chancre is not seen, or it is so insignificant in appearance and mild in character that its gravity is not appreciated. The chancre in some men is so insignificant and short-lived that it is looked upon as a chafe or as herpes.

Owing to their mild character and ephemeral course the early syphilides in some cases pass unobserved or unappreciated. It is very common in clinics and hospitals to call a patient's attention to a roseolous or a papular syphilide on his or her body, of which he or she had no knowledge or suspicion.

Then, again, in many cases the inguinal adenopathies may pass unobserved, or, if their existence is known, the patient is ignorant of their import. Mild primary and secondary syphilis are the usual unrecognized forerunners of tertiary syphilis.

Many women and children have syphilis, and suffer severely from it, yet they know nothing of the nature of their disease. It often happens, as Fournier aptly says, that "in women syphilis is the more likely to remain ignored, since all that is possible is done to hide the nature of the disease from them. The husband or the lover entreats the surgeon to treat his victim without revealing to her the cause of her malady; and amid this 'conspiracy of silence' she becomes cured of her *syphilis ignorée*."

In some cases for various reasons patients utterly deny having had primary or secondary syphilis.

Errors in diagnosis on the part of physicians not infrequently lead patients to think that they never had syphilis.

It follows, therefore, that we shall constantly meet with cases of tertiary syphilis in which the lesions or symptoms are so strikingly pathognomonic that no doubts as to their nature can be entertained, yet in which no evidence of early infection is obtainable.

CHANGES IN THE BLOOD IN SYPHILIS.

As a result of the infection various grades of anæmia may be observed. In exceptional cases a condition similar to pernicious anæmia may be produced. In the primary, secondary, and tertiary forms the red-cells and the hæmoglobin may be more or less reduced for longer or shorter intervals. In some cases no blood abnormality can be found.

Leucocytosis is a very constant condition in most cases, and is developed in various degrees; in some, however, it is absent. Mercurial treatment usually results in the suppression of the leucocytosis coincidently with the involution of specific lesions and the improvement in the patient's health.

Lowenbach and Oppenheim made researches into the condition of the blood in early and late syphilis, and found a marked reduction from the normal in the quantities of both iron and hæmoglobin, neither condition being influenced by therapeutic measures.

Justus' Test of the Blood in Syphilis.—An extensive series of observations with especial reference to their diagnostic value has been made on the hæmoglobin of the blood of syphilitics by J. Justus. More than 500 cases of all varieties are included, treated and untreated. He found that untreated cases of syphilis show a diminution of hæmoglobin which lasts a longer or shorter time, depending on the severity of the disease. A gradual increase then takes place as the signs of syphilis subside. If a therapeutic does of mercury is introduced into the affected organism by injection or inunction, a relatively sudden decrease of the hæmoglobin standard is observed (10 to 30 degrees in the Gowers' or Fleischls' hæmoglobinometer). This sinking may again be compensated for in the course of a few days, depending on the severity of the symptoms and the general condition of the patient. If the treatment is continued, the hæmoglobin may reach a higher point than before the former was inaugurated, and the point when no further decrease takes place marks the period when healing of the specific lesions begins. It is further claimed that the changes in hæmoglobin standard just noted are only to be found in the blood of florid syphilitic patients, and have not been observed in health or in any other disease. The reaction can be also found when invasion of distant lymph-glands takes place and in all varieties of the disease. It disappears when the syphilitic lesions disap-

year, but can again be demonstrated if any recurrence takes place. In using the test for diagnostic purposes care must be taken to employ the proper dose of mercury, at least 45 grains of the officinal blue ointment for adults, by inunction. Administration by mouth is not effective because of the slow absorption. Observations should be made the morning after the inunction. Subcutaneous injections of mercury bichloride (0.05 gm.) should be followed by observation eight to nine hours later. The author prefers the Gower hæmoglobinometer modified by Sahli. A diminution of 5 degrees or more in the latter instrument indicates the presence of a florid syphilis. In secondary and tertiary syphilis the same result obtains provided the specific lesions have not undergone involution. A negative result is not, therefore, diagnostic of the absence of the disease (at some previous time). The author finds, from a study of all cases where the test was properly applied, a positive result in from 70 to 80 per cent. of all doubtful cases.

In regard to Justus' test of the blood in syphilis Ewing's criticism is worthy of attention. He says: "Further studies are required before the value of Justus' test can be shown, but on general grounds it would seem that the test would prove unreliable in many cases of anæmia, when the globulicidal action of mercury might dissolve no cells.

THE MICRO-ORGANISMS AND BACILLUS OF SYPHILIS.

The bacteriology of syphilis is as yet in a wholly unsettled state, as is shown by the results arrived at by several distinguished investigators. According to Max Schüller, who has studied syphilitic tissues very extensively, certain structures which have much in common with those he has described as being the causative agents of carcinoma have been found. The organisms found in the syphilitic tissues he considers may, like those of carcinoma, be held to be members of some group of hitherto unknown protozoa. These consist mainly of two forms which may easily be obtained in fresh smears from primary lesions. The first form, which the author names "large capsules," when well preserved usually appear as somewhat pyriform or three-cornered bodies of brownish-yellow color. Their contents are of a darker shade, while the shell is of a glistening yellowish tinge. Under a high power small knob-like elevations are distinctly to be seen. Nucleated masses are also to be seen which apparently are the extruded protoplasmic contents of the capsule. The second form consists of much smaller rounded bodies somewhat lighter in color, having a double contour, and which exhibit distinct radial striations. These are termed by the author "young organisms," as in his culture experiments they appear to develop partly in the interior of the larger capsules and partly by fission. The author's investigations embraced studies of smears and sections from chancres, enlarged glands,

condylomata, gummata, joint-tissues, etc., taken from patients in the three stages of the disease and from those suffering from hereditary syphilis. In all of these, structures similar to those described, and also many modified forms, were discovered.

On the other hand, Max Joseph and Piorkowski have convinced themselves that a specific bacillus has been found by them. This hitherto undescribed bacillus was isolated from the spermatic fluid. The only way in which such investigation was successful was by cultivating this fluid upon sterile placenta at the incubator temperature for two or three days. In the secondary generation the bacilli could be grown upon the ordinary artificial culture-media. Upon such, however, they soon showed degenerative appearances, and, unless retransplanted upon human media, soon died. With Löffler's methylene-blue they stain almost identically to the diphtheria bacillus; in size, however, they correspond to bacillus subtilis. They stain positive with Gram's liquid. They are not pathogenic for the ordinary laboratory research animals; they are non-motile, coagulate milk, produce an abundant sediment in bouillon, and grow in a white, shining layer upon potato. They produce neither gas nor indol, and spore-formation has not been observed. They do not liquefy gelatin. These bacilli have never been cultivated from the spermatic fluid of normal men or of those suffering from tertiary syphilis. Fifteen of the former experiments have been made and eleven of the latter. On the other hand, this bacillus has been frequently isolated from mucous patches and enlarged inguinal glands of secondary syphilis. The effect of the administration of mercury upon the presence of the bacillus in the spermatic fluid is varied. In some cases under such treatment it soon disappears, while in others it remains for a long time. The authors think that the facts already produced warrant the assumption that this bacillus is the causative agent in the production of syphilis. Experiments on animals were negative. Attempts were made to infect mice, guinea-pigs, puppies, and swine, but no apparent influence of the subcutaneous and intraperitoneal injection of the cultures could be observed.

THE QUESTION OF THE IMMUNITY OF ANIMALS TO SYPHILIS.

The opinion has long been held that animals are immune to syphilitic infection.

Martineau about fifteen years ago claimed that he had communicated the disease to pigs and monkeys. Koch so utterly demolished Martineau's conclusions, and made such ridicule of his technical methods, that his inoculation-experiments went for naught.

Rabetel made incisions into the groin of a perfectly healthy bitch, and in the cellular tissue he placed portions of a fresh, hard chancre, and then

closed the wound. There was an ephemeral swelling of the parts, but in a few days nothing abnormal was to be seen. No glandular swelling occurred in a period of many months. He also injected 150 grammes of defibrinated blood-serum from a patient with active syphilis into the jugular vein of a young dog, without any effect whatever. These animals subsequently procreated healthy offspring.

Köbner was successful in inoculating rabbits with chancroidal pus, but he failed to infect dogs and rabbits by means of inoculations with active syphilitic-bearing vehicles.

Horand and Cornevin tried very assiduously to infect the pig with syphilis, but they reached the conclusion that the tissues of this animal are refractory to this disease.

Cognard claimed that he had inoculated a monkey with syphilis, but his colleagues thought that he had simply produced septicæmia in that unfortunate animal.

Vittone inoculated without success the fragments of six chancres upon rabbits, guinea-pigs, cats, and dogs.

Neumann inoculated active syphilitic material into three apes, three rabbits, a horse, a hare, a white rat, a martin, and a cat. Though he made fifty-four inoculations in all, his experiments were uniformly unsuccessful.

Haensell claims that he injected syphilitic products into the anterior chamber of the eyes of rabbits, and produced iritis and little nodules which appeared from twenty-five days to one and three months after the inoculation. These nodules were looked upon as gummata, and the conclusion of the experimenter was that he had produced syphilis; but there is no evidence offered of the existence of a general infection.

Lassar, 1904, claims that he successfully inoculated a chimpanzee with syphilitic virus. The animal was a vigorous male four to five years old. The patient from whom the virus was obtained was a young man, who had contracted the disease through the use of infected tattooing needles, and the material used was taken from the primary lesion on his arm. He also undertook the care of the animal after the infection, a matter of some importance, since, if the experiment proved successful, any injury inflicted by the chimpanzee on his healthy attendants would be likely to have serious consequences. Bits of tissue and secretion from the patient's chancre were placed in pockets and punctures made under the skin of the forehead, the ears, and in the mucous membrane of the mouth. These various spots healed promptly and without reaction, and only two showed any later change. These were above the eyebrows, and on the fourteenth day began to show induration, which subsequently assumed the typical appearance of a hard chancre. Still more important as evidence of infection is the fact that other lesions developed in the

palms of the hands, on the soles of the feet, and about the anus. Similar eruptions appeared on the arms, the forehead, and on the scalp, which gradually lost its hair. Microscopical sections also seemed to demonstrate that the formerly accepted dictum that syphilis is non-transmissible to animals is erroneous, and that the anthropoid apes are susceptible to the disease.

Similar results were obtained by Roux and Metchnikoff by experimental inoculation on anthropoid apes. Many other cases of experimental inoculation with the products of syphilis upon pigs, rabbits, and guinea-pigs have recently been reported as successful, upon which a verdict of not proved is all that can be said.

REINFECTION WITH SYPHILIS.

As a general rule, syphilis, like small-pox, scarlet fever, measles, etc., attacks the individual but once in his lifetime, but a sufficient number of well-attested cases have been published to warrant the statement that in certain rare instances syphilis does attack the individual twice in his lifetime. There have been published up to date about one hundred and sixty cases of syphilitic reinfection, and it is safe to say, allowing much latitude, that not thirty of the whole number are authentic instances.

The great source of error in this subject is to be attributed to the relapsing indurations, which thoroughly convince many men that they have a second hard chancre before them. As the knowledge of these lesions becomes more clear and extended there will be fewer reported cases of second infection with syphilis.

When we carefully review the whole subject we may admit that genuine second attacks of syphilis occur, but that they are very rare. All suspected and putative cases should be approached with caution and reserve, rather than with a sanguine and credulous spirit. We need much further light on this important subject, and scientific evidence can only be obtained by a rigid examination and study of each case. Before a given case shall be accepted as true and beyond controversy the following facts must be established as clearly as possible: In the first attack, the existence of a true hard chancre followed by characteristic adenopathies and a clear history of the secondary stage and its lesions, and perhaps of a tertiary stage. Then a sufficiently long period of time should elapse in order to show that the diathesis has become extinct. Many cases have been reported in which one, two, or three years only have elapsed between the two so-called separate attacks of syphilis. Such cases are without doubt apocryphal. In the light of the cases already published it is not too much to say that no case is worthy of consideration in which the interval between the cure or apparent cessation of the first attack and the onset of the second one is

least not under five or six years. Very long intervals will inspire one with moderate credulity.

The further requirements are that the history and characteristics of the second chancre shall be satisfactorily made clear, and the involvement of the ganglia established beyond a doubt. Then a clear clinical picture of the period of general manifestations must be given before we accept the case as one of second infection with syphilis. If these requirements are fulfilled, it is safe to say that in the future we shall not be favored, as we have of late about once in two or three months, with a new case of syphilitic reinfection.

It is stated by a number of writers that second attacks of syphilis run a very mild course. Since this statement is largely based upon the features offered by apocryphal cases, it is not worthy of consideration. In my five cases the second attack was very severe, and in two instances it ended promptly in death. It is unwise, however, to draw conclusions from a few cases; therefore it is well to wait for future observations as to the intensity of the course of cases of second infection with syphilis.

In Plate XXVII. is admirably depicted a case of second infection with syphilis which was under my observation in the two attacks of this disease. The first infection with syphilis occurred when the woman was twenty-seven years of age. She had the primary or initial lesion, which was followed by marked indurating œdema of the labia minora and majora, together with typical inguinal adenopathies. She further had a generalized papular syphilide and mucous patches, and suffered from nocturnal pains and rheumatism. Later, a characteristic serpiginous syphilide appeared on the arms and forearms and neck. Syphilitic muscular contraction of the right biceps brachialis was severe and persistent. In Plate XXVII. is well shown the scars left by the serpiginous syphilide, and typical scars were also seated on the right side of the neck and on the right arm. Eleven years after the onset of the first attack of syphilis, the second infection occurred. For some time I was unable to discover the initial lesion of this attack, but later I found it very clearly. From my notes I quote the facts as to the second infection with syphilis: I found this woman again in my wards, presenting a pitiable appearance. She was thin, emaciated, and weak, and showed a low power of assimilation. She had become broken down by reason of irregularities of life and privation. Over her whole face and neck was a profuse, small, miliary, papular syphilide scattered in indiscrete form. Throughout the scalp, papules and small pustules were abundant. In the centre of the forehead a well-marked incrusted rupial ulcer was prominent. Over the body the miliary syphilide was very copious and conspicuous, existing in its typical corymbiform arrangement, and also as a generalized scattered eruption. Nothing could be more positively diagnostic, for between the papules,

PLATE XXVII.

AUTHOR'S CASE OF SECOND INFECTION WITH SYPHILIS.

fading, slight patches of roseola could be distinctly seen. Over the arms and forearms the miliary syphilide was copiously scattered, and over the thin, delicate cicatrices of the serpiginous syphilide of the first infection these papules were placed in great numbers. On the left arm the sequelæ of the hospital vaccination had developed into an incrusted rupial ulcer. The general appearance of the patient and of her lesions is well shown in Plate XXVII. Over the whole body the ganglia were markedly enlarged. She also suffered from mucous patches of the tongue and mouth, and showed evidences of alopecia. She suffered severely with pains in the larger upper joints and in the knees and feet by day and worse at night. As a result she was confined to bed, and her cure was no doubt retarded in consequence of want of exercise, fresh air, and sunlight. She was treated by mercurial inunctions and, by reason of the existence of the fibrous tissue lesions, iodide of potassium was at times administered. As a result the active lesions were cured, her general condition was much improved, and she suffered from no pains.

I have had under my care and observation four other cases of reinfection with constitutional syphilis.

As I have said before, the scrutiny of cases claimed to be instances of second infections with syphilis cannot be too rigid, and in these days, when so many putative cases of reinfection are being published, it is necessary to examine them carefully before accepting them.

CHAPTER XXVI.

PATHOLOGY OF SYPHILITIC INFECTION AND OF THE SYPHILITIC PROCESSES.

CONSIDERED structurally, syphilitic inflammation is in many respects similar to tubercular inflammation, and the lesions of syphilis viewed as a whole resemble tuberculosis morphologically more closely than any of the other classes of inflammation. In all probability, syphilis is due to the presence in the body of some form of bacterium which yields a specific toxin which is a largely instrumental factor in producing some the syphilitic manifestations.

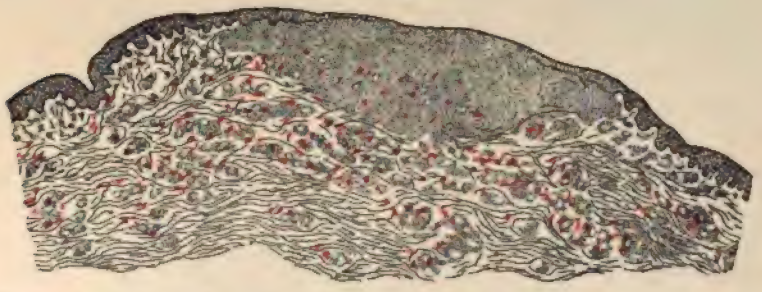
With the exception of the formation of gummata, the characteristic feature of the secondary and tertiary periods is an early and persistent involvement of the bloodvessels throughout the whole course of the disease. In addition to these two characteristic lesions of syphilitic inflammation, a third morbid condition may occur, which consists in a tendency to the production of new connective tissue, especially in the central nervous system in the late stages of the disease, perhaps years after the invasion of the primary sore. This chronic production of connective tissue is a slow, persistent, gradually progressive process, and many of the scleroses of the nervous system—such as tabes dorsalis, for instance—may be ascribed to it. Whether this late and chronic production of connective tissue in the nervous system is due to some inherent property of the syphilitic virus, stimulating the connective-tissue cells directly, or whether the new tissue grows as a result of the tendency of syphilis to damage the bloodvessels, cannot be definitely determined.

In addition to these three more or less distinctive traits of syphilitic inflammation—viz., the gummy tumor, the persistent involvement of the bloodvessels, and the late and gradual production of new tissue in the central nervous system—the general lesion of the disease is the occurrence of more or less circumscribed tissue, which consists of small round cells, or of these mingled with larger polyhedral cells, or occasionally giant cells. This is the tissue which is found in the earlier stages of the disease in the initial sores, papules, tubercles, and condylomata.

This newly formed richly cellular tissue, occupying large or small areas, may be circumscribed or spread out diffusely, especially in the mucous membranes. These foci, as a rule, contain few bloodvessels,

and tend to undergo coagulation-necrosis, and to disintegrate at their centres. Finally, they may be converted into cicatricial tissue. The bloodvessels near these inflammatory foci frequently have swollen or proliferating endothelium and infiltrated walls. Later on the blood-

Fig. 119.

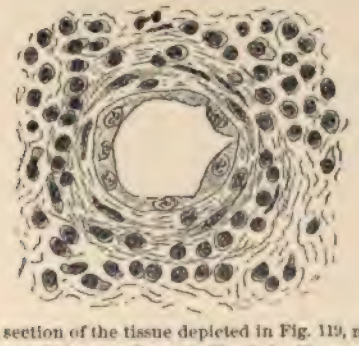


Showing the chancre (at the right upper part) and small vessels with the coat-sleeve arrangement of the cell-infiltration in the deep connective tissue under and beyond the chancre. (Vessels represented by red dots in Fig. 119.)

vessels may become diseased independently by chronic processes. They may become subject to thickening or obliterative endarteritis, or otherwise undergo extensive changes.

In the primary lesion, or *chancre*, there is a small round-celled infiltration of the connective tissue, proliferation of the connective-

Fig. 120.

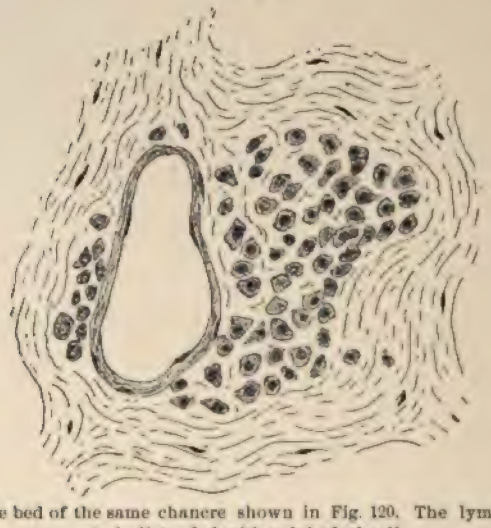


A small artery taken from a section of the tissue depicted in Fig. 119, more highly magnified. Both the middle and outer coats of the vessel are infiltrated with small round cells. The lining endothelial cells are also swollen.

tissue cells, and an abundance of leucocytes. (See Fig. 119, from a section of a chancre of the prepuce of four days' duration.) A chancre also shows more or less necrosis or degeneration of its constituent cells. An uncomplicated chancre in its early stages is identical in its general structure with a small superficial ulcer or patch of granulation, except that in the chancre there is distinctly more necrosis and degeneration of its constituent small spheroidal cells.

The bloodvessels surrounding the chancre, as well as those a considerable distance from the chancre, even in its earliest stages of development, are uniformly changed. (See Figs. 120 and 121.) The endothelial cells are swollen or proliferating, the walls of the vessels may be infiltrated (Fig. 120), and, finally, the perivascular spaces are crowded with proliferating polyhedral cells (Figs. 120 and 121).

FIG. 121.



A vein just below the bed of the same chancre shown in Fig. 120. The lymph-space about the vein is distended with polyhedral cells.

While this condition of the bloodvessels may be found associated with other forms of inflammation, especially when the vessel is directly in the path of an advancing inflammation or lies on the border-line of the normal tissue, in a chancre the extensive distribution and early involvement of the vessels are characteristic. The extensive distribution of the perivascular changes, their topographical arrangement, and early involvement in regions slightly beyond the chancre are the striking features in the initial sore, rather than any peculiarity of structure of the lymph-space lesion.

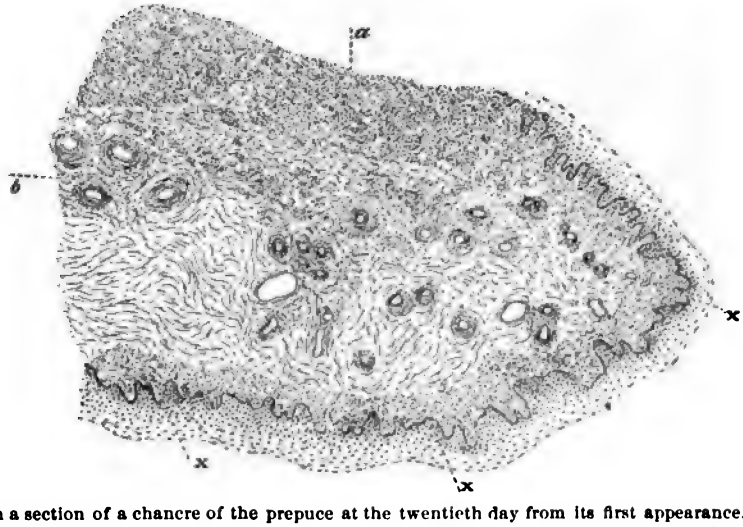
There are, however, certain stages in the development of chancroid in which the perivascular spaces leading from this form of sore exhibit a similar condition, and, like the vessel-spaces in syphilis, seem to be propagating a virus to the inguinal lymph-nodes.

Thus, whatever the causal agent of syphilis may be, it very soon reaches the perivascular spaces and travels along these, or it initiates a proliferation of cells in the lymph-spaces about the vessels which rapidly propagates and extends along these spaces to more distant parts of the body.

This early and extensive lesion of the lymph-spaces about the blood-vessels, especially the smaller veins, enables us to understand more definitely how the virus of syphilis spreads, how it travels along these lymph-spaces, accompanying the vessels to the root of the penis, to the first set of lymph-nodes which such a set of perivascular lymphatics communicate with—namely, the inguinal ganglia. From these inguinal nodes the cell-proliferation, in response to the syphilitic virus, is propagated, it would seem, to the lymph-nodes in general throughout the body in greater or less extent, and in this way the general adenopathy is established.

Finally, in regard to this extension of syphilis through the perivascular spaces from the primary sore to the inguinal glands, it may be pointed out that it occurs very early and proceeds with great rapidity. As soon as the chancre appears the network of peripheral perivascular lymph-spaces is already involved, and, as indicated by the line of pro-

FIG. 122.



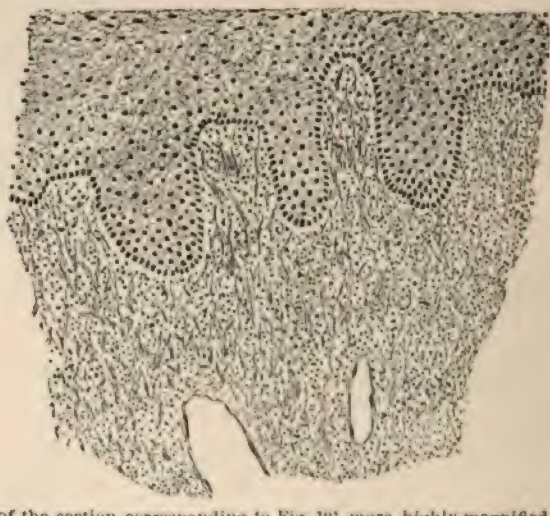
From a section of a chancre of the prepuce at the twentieth day from its first appearance. The indurating œdema corresponds to a distention and infiltration of the upper layers of the derma, which extends as a zone. *x*, *x*, *x*, about the centre of the chancre at *a*. The infiltration of the walls of the vessels is also well exhibited, especially at *b*.

liferating cells along the venous lymph-spaces, the virus is already on the path to the inguinal lymph-nodes. It can be seen, therefore, that it is impossible to stay the course of syphilis by excising the chancre. Not only the chancre, but all this chain of venous lymph-spaces communicating with the inguinal lymph-node would also have to be removed to abort the syphilitic infection of the body.

The stage of *induration* or *indurating œdema* remains to be considered in describing the structure of a chancre. If a chancre at the well-pro-

nounced stage of induration be examined microscopically (Fig. 122), it will be seen that the semi-necrotic mass of small spheroidal cells (Fig. 122, *a*) composing the bed and main bulk of the ulcer is circumvallated by a zone of œdema and cellular infiltration of the papillary portion of the derma (Fig. 122, *x*, *x*, *x*). Indurating œdema, then, as the name implies, is a wall about the chancre wherein the interfibrillary spaces of the pars papillaris are distended with fluid and small round cells (Figs. 122 and 123).

Fig. 123.



From a portion of the section corresponding to Fig. 191, more highly magnified. The interfibrillary spaces of the upper layers of the derma are distended with fluid and small round cells.

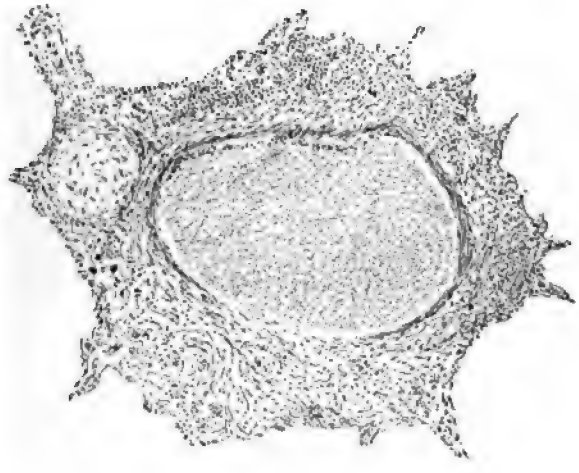
To recapitulate briefly the series of changes in a chancre: When the causal agent of syphilis, presumably some form of bacterium, enters through the skin or mucous membrane, it excites local leucocytosis and exudative inflammation, with more or less necrosis; there are also proliferation of the connective-tissue cells, a propagation of proliferating cells along the perivascular lymph-spaces, and later a wall of infiltration and œdema of the upper corium layers formed about the periphery of the ulcer corresponding to the stage of indurating œdema. Finally, the sore tends to heal and become converted into scar-tissue.

Following the initial sore there may be inflammation of the lymph-nodes, of the skin and mucous membranes, of the bones, and of several viscera, which are structurally similar in each case.

Although not confined strictly to the secondary stage of syphilis, the *gummy tumors*, or *gummata*, form the distinctive feature of this stage, and, structurally, are characteristic of syphilis. A small gumma consists of a mass of small spheroidal and epithelioid cells, and occasionally giant

cells. Small gummata may resemble miliary tubercles so closely that from microscopical appearances alone it is difficult to distinguish them apart. The larger gummata have rather characteristic gross appearances: to the naked eye they appear as grayish-white, rather firm, spherical nodules; they generally have a firm, cheesy centre and a translucent pearly capsule merging into the surrounding tissue. In structure such a gumma has a granular necrotic centre surrounded by a connective-tissue envelope which is generally infiltrated with small round cells and sends off prolongations into the surrounding tissue, so that when situated in the viscera the gumma is quite sharply circumscribed. (See Fig. 124.)

FIG. 124.



A gumma of the liver which has a cheesy centre, a connective-tissue capsule with processes extending into the surrounding tissue, and infiltration of the same with small round cells.

This description outlines the broader features of syphilitic inflammation as a phase or variety of inflammation in general; but we cannot interpret these morbid changes very intelligently until the micro-organism of syphilis is discovered and the nature and action of its toxin are learned.

The chronic production of neuroglia in the central nervous system, due to syphilis, should not be confused with a more specialized form of syphilis of the nervous system which not infrequently occurs in untreated or improperly treated cases. This form of involvement of the nervous system, termed usually "syphilis of the nervous system," may occur moderately early in the disease. It has a subacute character, is prone to occur in a disseminated form, especially in the spinal cord, and consists of masses of small round or fusiform cells, which involve either the gray or the white matter.

CHAPTER XXVII.

VEHICLES OF INFECTION IN SYPHILIS.

CLINICAL observation and experimental inoculations have proved that the secretion of the initial lesion contains in a high degree the virus of syphilis. It is from the secretions of the initial lesion that infection with the disease is derived in the great majority of cases.

Equally as virulent are the secretion and the tissue-detritus of the secondary lesions known as condylomata lata and mucous patches which occur so frequently in and about the mouth and face and on the genital and anal regions.

Experimental inoculations (of course, upon human subjects, since animals are immune) have proved that the secretions from pustules, from syphilitic tubercle, and from ulcers and papules produce typical syphilitic infection in the person operated upon.

Numerous experimental inoculations with the blood of syphilitics have given rise to well-marked instances of syphilitic infection. Clinical observation has frequently confirmed the results of experimentation as to the infectious quality of the blood of syphilitic subjects.

It seems, however, that it is only in the quite early period of the disease, when the infection is active, that the blood is most poisonous. With the decline of the disease, particularly when it has been profoundly modified by mercurial treatment, the blood becomes more and more feebly infectious, so that in general after one or two years' thorough treatment it is harmless. It is, therefore, the least infectious of all syphilitic-bearing secretions or fluids.

The initial lesion of syphilis, therefore, has its origin—

1. In the secretion of, and organized matter derived from, a previous hard chancre or initial lesion;

2. In the secretions and the organized matter of the secondary lesions of syphilis, whether of the skin or of the mucous membrane: that of mucous patches and condylomata lata has been shown to be especially contagious, and that of papules and tubercles less so;

3. In the secretions of hereditary syphilis in its active state, which arise from buccal mucous patches or erosions, condylomata lata of the mouth or anus, and also from ulcerated tubercular lesions;

4. In the blood of persons in the active state of syphilis: the lymph also may communicate the disease.

Such is the bland, unirritating character of the various infecting

secretions of syphilis that it is very probable a door of entry, such as a fissure, an abrasion, or other denuded surface, perhaps so small as not to be visible, is generally necessary for their introduction. It is claimed, however—and no doubt reasonably—that the virus may penetrate the thin, soft, and moist epithelium of mucous membrane. Clinical facts show clearly that it may penetrate into the orifices of the mucous and sebaceous follicles, and in them take root.

Syphilis pursues essentially the same course whether derived from a primary or secondary lesion; in the latter case, as in the former, the initial lesion is a chancre.

It is conceded by most authorities that only the secretions of secondary lesions are infectious, and those of the tertiary period are inert. Unfortunately, we are not in possession of enough knowledge upon this subject to make positive statements. It is very certain that when the disease is active, as shown by the extent and severity of its lesions, the secretions of its bearer are markedly infectious. As time passes the morbid condition tends in most cases to attenuation, and the infectious nature of the secretions grows less. There is a natural tendency in very many cases for the disease to grow less and less active until in the end its virulence may cease. This gradual extinction of the disease may take place spontaneously without the aid of therapeutics, but this natural involution can never be relied upon. The most potent element in curing the disease and in rendering the subject incapable of infecting others is active and energetic treatment kept up for the first two years or longer. Under proper treatment the infectiousness of the disease quite rapidly diminishes, and finally becomes extinct.

It is very probable that the secretions and tissue-elements of many of the tertiary lesions, particularly when they are active and numerous and occurring within three, four, or five years, may be endowed with a virulent power, and that they may lose this virulence at later periods.

The normal secretions of a syphilitic subject do not of themselves contain any virulent principle. They may be contaminated by admixture of secondary secretions and of the tissue-elements of secondary lesions, and by blood.

The semen of a man, even in the secondary stage of syphilis, is not *per se* an infectious fluid. It may remain on the mucous membrane of the female genitals for a long time without causing any result. It does not contain an active virulent principle.

When the semen of a man suffering from an active form of syphilis fecundates the female ovum, in the majority of cases he transmits the disease to the infant. In this way alone is the semen of the syphilitic man dangerous.

MODES OF INFECTION.

These are, first, direct contact; second, mediate infection; and third, hereditary transmission. We are warranted in assuming that in all instances of syphilitic infection there is a lesion of continuity or gap in the epithelium of the skin or mucosa.

Infection by direct contact is the most common mode of contamination, and the sexual act is the one by which the disease is in most cases given and received.

Direct syphilitic infection frequently results from unnatural and beastly methods of indulgence between persons of the same and the opposite sex. In this way are developed chancres of the anus, of the tongue, of the folds between the breast and the sides of the chest, of the axillæ, and of the tonsils. I have known several instances in which men were infected upon the penis by contact *ab ore* with men or women who had syphilitic lesions in their mouths. Several men have told me that they followed this practice, thinking that by it they would escape syphilitic infection.

Kissing also is a prolific source of infection, and as a result of this act chancres of various parts of the body are produced.

Not infrequently hereditarily syphilitic children infect their nurses upon the nipple from mucous patches in the mouth. Then, again, children have been infected from chancres or condylomata lata on the nipples of their nurses.

I have a number of times seen chancres of the nipple in women produced by suction of a man having mucous patches in his mouth. Then, again, I have seen two instances of chancre of the nipple in men contracted from the mouths of syphilitic women in the act of suction.

There are in literature many cases reported in which syphilitic midwives, usually of the lower classes, have infected nursing women with syphilis upon the nipple in the act of suction or drawing the breast, which they sometimes perform.

In some European countries, particularly Roumania, a singular method of transmission is said to occur. It is the custom there to attribute all affections of the eyes to foreign bodies, for the relief of which there is a class of women, called "leeching oculists," who suck or cleanse the eyelids with their tongues. One of these women, having mucous patches in her mouth, conveyed the disease to many persons.

Syphilitic infection is sometimes produced during brawls and fights in which an infected person bites his or her antagonist. In this way, also in exuberant embraces between the sexes, one or the other sometimes becomes syphilitic.

Surgeons very frequently contract syphilis on cuts and abrasions

about the fingers and hands when operating upon syphilitic subjects. Physicians, accoucheurs, and midwives also frequently contract syphilis in vaginal examinations of infected women. They, in turn, have been known to spread infection far and wide in an epidemic form by infecting women during examinations about the genitals by means of their finger-chancres. From the infected wives the husbands, children, and friends have become contaminated.

There are many cases in literature in which syphilis has been communicated in the operation of tattooing, the operator using his own saliva, which was contaminated by the secretion of mucous patches.

In the operation of skin-grafting the disease has been given to the person operated upon by the graft, which was derived from a syphilitic subject.

Dentists sometimes contract syphilis from the mouths of infected subjects, and it is very probable that the latter are sometimes infected by means of instruments smeared with active syphilitic secretions. It is a good rule to avoid the services of a careless or uncleanly dentist.

In ritual circumcision, when the flow of blood is stanched by immersion of the infant's penis in the mouth of the operator, there is danger of syphilitic infection.

In these days, when pure bovine virus is used in vaccination, there is no possibility of the transmission of syphilis by that secretion. The danger arises in carelessness on the part of the operator in using a soiled scarificator. In the hurry incident to the vaccination of many persons the surgeon is liable to become careless and to fail to cleanse the instrument after each operation. In this way it may happen that a syphilitic patient may be vaccinated and the instrument used may become smeared with blood and tissue-débris. Then, if this instrument is used to scarify the next subject without having been cleansed or subjected to a flame, the blood and the tissue-elements are firmly implanted upon and into his or her excoriated surface, and it is pretty certain that syphilitic infection will be produced.

Mediate Infection.—In this form of infection the disease is communicated by means of articles, implements or instruments which have become smeared or impregnated with the syphilitic virus. In cases of this form of infection the contaminated parts are most commonly the lips, the gums, the mouth, and the eyelids. Any part of the integument and of the genitals may also be the seats of infection. The following list includes most of the articles and instruments which have been found to be the agents of mediate syphilitic infection: cigars, cigar- and cigarette-holders, pipes, tooth-brushes, tooth-powders, drinking utensils, knives, forks, spoons, razors, towels, sponges, pillows, masks, gloves, wash-rags, linen thread, silk thread, pins, needles,

children's toys, nursing-bottles, rubber tubes, babies' rubber rings, trousers, women's drawers, bandages, surgical and cupping instruments, manicure instruments, syringes, scarifiers, dental implements and appliances, caustic-holders, blowpipes, paper-cutters, lead-pencils, speaking-trumpets, musical instruments, fish-horns, whistles, the mouth-piece of the telephone, chewing-gum, and even pastilles and candy.

There is a mode of syphilitic infection which has not yet been described—it is really auto-infection. It generally occurs in this way: A man, fearing to contract venereal diseases or for other reasons, contents himself with a digital exploration or fondling of the female genitals. Upon the latter condylomata lata or syphilitic excoriations being present, the fingers of the man become soiled with their secretion. Then by accident the virus is transferred by the finger or fingers of the man to some other part of his own body, generally by scratching or picking. In this mode the finger becomes a medium of infection, and the infected parts are usually the alæ nasi, the tip of the nose, the chin, the cheek, the neck, the arm, and the back of the hand.

It is rather revolting to one's feeling to put the matter on paper, but the interests of medical science certainly warrant the recital. I have seen two cases in educated and religious people in which the weight of evidence strongly pointed to the origin of their labial chancres in the communion cup. Knowing as we do so well that many innocent persons, particularly women, become unconscious victims of syphilitic infection and still follow the observances of a religious life, it is not far-fetched to assume that their diseased mouths may contaminate the sacred chalice.

CHAPTER XXVIII.

THE CHANCRE, OR THE INITIAL LESION OF SYPHILIS.

AT the end of the *first period of incubation* the first evidence of syphilitic infection shows itself in the form of a small and usually innocent-looking lesion, which, as we have seen, is called the initial lesion, the Hunterian chancre, and by other terms. In the great majority of cases the initial lesion is seated on the sexual organs, and it is then termed genital chancre, while that found elsewhere on the body is called extragenital chancre.

This first period of incubation, as we have seen, varies in length between twelve and thirty, and exceptionally forty, fifty, sixty, and seventy days. It follows, therefore, that if a man seeks information as to his chances and condition after a suspected or suspicious coitus, he should be told that at any time between the fifteenth and sixtieth or seventieth days the chancre may appear, and that he must be constantly on the watch for it, for his own benefit in promptly seeking treatment and for the protection of women with whom he may have intercourse. In the vast majority of cases it is not necessary to prolong a man's anxiety and even agony beyond thirty days.

It is very important that clear ideas should be held as to the induration of chancres. The terms hard and indurated chancres act as stumbling-blocks to very many physicians in their estimate of the nature of genital ulcers and lesions. The tendency, I observe, has been not so much to form an opinion by a consideration of the physical appearance of a given lesion as by its relative hardness and softness of structure. When a genital lesion is brought to the attention of the surgeon he instinctively feels of it, and in general, if he can find no resistance or induration, he at once pronounces it to be a soft sore, or chancroid. In this way mistakes in diagnosis are made every day. Now, at the outset it is important to know that induration is not present in primary syphilitic lesions in their early days. The cell-proliferation which gives rise to the symptom of induration goes on, as a general rule, slowly, and it is seldom clearly and sharply appreciable before the tenth day; and in general terms it may be stated that, as a rule, fourteen days elapse before sharply marked, circumscribed, easily appreciable induration is present in a primary syphilitic sore.

In a large majority of cases there is but one chancre or initial lesion, but it is not uncommon to see two or three, and exceptionally four,

six, seven, or even more, initial lesions. There is a deep-rooted and widely prevalent view in the minds of many medical men that the initial lesion is invariably solitary, and that when several genital ulcers and even excoriations are seen they must be chancroids. As a result of this an incalculable number of mistakes in diagnosis are constantly made, which result in disappointment and often disgust to the patient, and in deep chagrin to the surgeon. The penis, the female genitals, the female breasts, and the cephalic regions are the parts upon which multiple lesions are most commonly found.

In the male, chancres are found on the glans, on the prepuce, on the skin of the penis, on various parts of the penis, involving the meatus, within the urethra (not visible on forced separation of the lips of the meatus, but recognized by palpation, inflammation of the lymphatics, etc.), on the scrotum and penoscrotal angle, the anus, the lips, the tongue, the gums and hard palate, the pharynx (including the tonsils), the nose, the pituitary membrane, the eyelids, the fingers, and on the legs.

APPEARANCE OF THE INITIAL LESION, OR CHANCRE.

In its early stages the chancre is such a seemingly trifling and innocent lesion that its virulence is very apt to be overlooked.

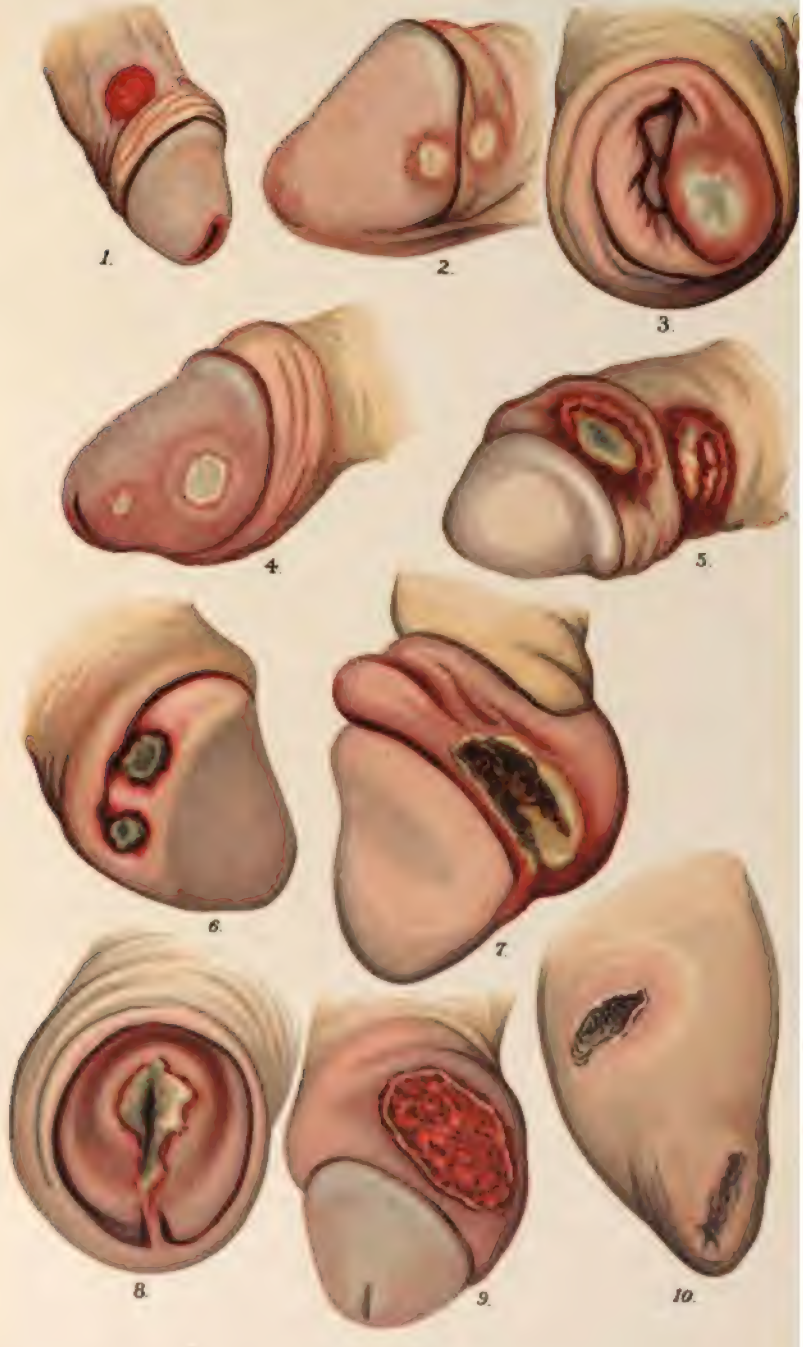
There are six conditions under which chancres appear at their very beginning: these are—first, the chancrous erosion; second, the silvery spot; third, the dry papule or patch; fourth, the umbilicated papule or nodule or follicular chancre; fifth, the purple necrotic nodule; and, sixth, the ecthymatous chancre.

Besides the six type-forms, there are the following varieties which are due to certain changes to which the primary sore is liable: the ulcus elevatum, multiple herpetiform chancre, the parchment chancre, the annular chancre, the indurated nodule or mass, the chancre with cream-green membrane, and infecting balanoposthitis.

The Chancrous Erosion.—The chancrous erosion, by far the most common form, is really the primordial lesion from which all chancres develop. It begins as a minute, sharply rounded excoriated spot, the surface of which is on a level with the surrounding parts. It looks exactly like an erosion or shedding of the uppermost epithelial layer. (See Plate XXVIII., Fig. 1.) The color is a dull red, which later may assume a coppery hue.

This form of chancre is most marked on the internal surface of the prepuce, by which it is protected from the air, irritation, and friction; and it is in this situation that it is most frequently met with. It has generally a circular or ovoid, but sometimes irregular, outline. Its floor is but slightly, if at all, excavated, and occasionally is even elevated

PLATE XXVIII.



HARD CHANCRES.

above the surrounding integument. It has a smooth, polished surface, usually destitute of granulations, but sometimes slightly granular and velvety, from which considerable serous fluid oozes, particularly on manipulation. Its surface is destitute of the persistent and adherent exudation of the chancroid. At times it is dark or even black, owing to molecular gangrene. This lesion sometimes becomes decidedly saucer-shaped. When extensive and persistent these chancres are called beefsteak chancres. (See Plate XXIV., Fig. 4.)

Usually there is but one such lesion; but there may be three, four, or five, and very exceptionally more than a dozen. When a number of these chancrous erosions are grouped in the corymbus-like form peculiar to herpetic vesicles, for which they are very liable to be mistaken, they are called *multiple herpetiform chancres.* These chancres have a diameter of a line or less; they are small round excoriations, of a deep-red, sometimes coppery hue, which bleed readily and have a very slight induration of their bases. The induration usually increases at a later period. From five to fourteen chancres may be observed upon the prepuce or glans. In their first stage the diagnosis is difficult, but the absence of itching and burning, their dark color, and their chronicity are points which aid in distinguishing them from herpes. Another important feature is that their surface is smooth and shining. Moreover, induration of the inguinal ganglia is soon developed.

The chancrous erosion is constantly mistaken for herpes progenitalis, and is in many instances pronounced by the surgeon to be a simple chafe or excoriation. Consequently, it is always well to be cautious and slow in expressing opinions concerning seemingly insignificant lesions of the genitals. The smooth, shining surface of the syphilitic lesion is in many cases diagnostic, but it may, owing to extraneous influences, become granular and perhaps ulcerated. It has been claimed that herpetic vesicles give issue, particularly if pressed between the finger and thumb, to a copious serous secretion, and that this does not occur in cases of the chancrous erosion; therefore, that this is a diagnostic sign between herpes and the syphilitic lesion. The truth is that the chancrous erosion gives issue to far more serum than does the herpetic lesion.

When it simply remains a superficial, compact lesion, the induration is spread out into a disk-like mass, and the lesion is then called the *parchment-like chancre.* On the other hand, when the syphilitic process dips down into the subcutaneous connective tissue, and is complicated with indurating œdema, the chancrous erosion becomes the *indurated nodule.* Parchment-chancres are mostly found on the integument of the penis and sometimes in the vulva. Indurated chancres are mostly found in the sulcus coronarius, particularly near the frænum.

(See Plate XXVIII.) When, owing to excessive cell-increase, the chancrous erosion becomes salient above the level of the part, it is called *ulcus elevatum.*

In many cases these flat or elevated chancres become covered with a false membrane, very incorrectly called "diphtheritic," which is peculiar in having a color which is a mixture of a cream with a light-green tint. This membrane may exist for longer or shorter periods. As it grows old, if not shed, it sometimes becomes in whole or in part of a brown or brownish-black color. It, as a rule, does not cover the whole of the chancrous surface, but rather its central portions, leaving the margins free. This film-like or more dense membrane is very distinctive, even diagnostic of chancres. It is well shown, as to extent and color, in Fig. 3, Plate XXVIII., seated on a well-marked indurated nodule. (In Figs. 2, 4, and 8 also it is well portrayed from my own cases.) This membrane often becomes discolored by the admixture of dirt and also as a result of minute hemorrhages. Thus in Fig. 5 the membrane is darker than it is in the previous figures, while in Fig. 7 it reaches its acme. This membrane may remain on the sore for a short or a long time. If antiseptic lotions or iodoform is used, it melts away and an erosive chancrous surface is left. This lesion may very properly be called the *chancre with the cream and green-colored membrane.*

In some rare cases these chancres become necrotic, an accident which is well shown in Fig. 6, Plate XXVIII.

The Silvery Spot.—This lesion, first described by me, is very rare and presents well-marked features. It generally occurs on the glans and on the lips of the meatus, and at first it looks as if a pinhead-sized spot of mucous membrane had been touched with carbolic acid or nitrate of silver. Examined with a magnifying glass, there is no other change evident than the peculiar staining of the superficial epithelial cells. The silvery lesion increases slowly but visibly day by day, and preserves its integrity of surface until it reaches an area of about a line, when, coincidently with the subjacent induration, which has been simultaneously developing, and which has slowly raised it up, it disappears, and is replaced by a smooth, shiny surface like that of the chancrous erosion or that of some indurated nodules.

The Dry Papule.—This chancre is usually found upon the glans or prepuce when not in a state of coaptation, and consequently is always developed in a very dry condition. As a rule, it is solitary, and is not uncommonly seen on persons who have been circumcised or who have short prepuces. It is found upon the integument of the penis, about the pubes, on the thighs, and elsewhere upon the body. (See Fig. 1, Plate XXX.)

A modification of this form of the initial lesion has been described

"diphtheroid as of the glans," a very incorrect term, since neither in appearance nor course does the lesion at all resemble diphtheritic membrane, which is always seated on an excoriated surface. It consists of patches of a glistening grayish-white color, presenting either a greasy sensation to the fingers or something like that of wet chamois-skin. The lesion is slightly salient, not indurated, involves the superficial tissues, the mucous membrane of the glans and sometimes of the prepuce, has sharply defined borders, and gives rise to no secretion from its surface.

The **umbilicated papule** or **follicular chancre** is a rare form of the initial lesion, of which I have seen six cases. It begins as a pinkish elevation of the size of a milium, with a minute depression in the centre, which grows slowly and assumes in form the appearance of a tumor of molluscum sebaceum. Further increase takes place until a pea-sized tumor is formed. As the lesion grows the central depression becomes broader and deeper, until when fully developed the chancre becomes cup-shaped and looks as if set in the mucous membrane, with its borders markedly elevated.

The Necrotic Nodule.—The purple necrotic nodule is also a rare form of the initial lesion. It is always, according to my experience, found upon the glans penis and in the coronary sulcus. It begins as a small dark-red spot which soon becomes elevated; as it grows its color deepens; it becomes salient and roundly convex on its surface. This chancre is prone to necrotic degeneration.

VARIETIES OF CHANCRE.

The Ecthymatous Chancre.—The ecthymatous chancre is simply a chancre which becomes covered with a pus-crust. It is developed from the dry papule or the chancrous erosion or the ulcus elevatum. The surface of the lesion becomes mildly exulcerated, and slowly a flat crust forms which is of a brownish-black or greenish-brown color. (See Plate XXVIII., Fig. 10.) The crust is formed of pus-cells, tissue-detritus, and numerous microbes. The term "ecthymatous" might convey the impression that the lesion begins as a pustule; this it never does. It is simply a hard chancre which is mildly irritated in its surface, and as a result slowly becomes covered with a crust. In this particular only does this lesion resemble ecthyma. This form of chancre is found upon cutaneous surfaces, particularly of the penis and juxtagenital parts. (See Fig. 2, Plate XXX.)

The Annular Chancre.—The term "annular chancre" is applied to primary lesions in which the great part of the new growth is developed in a ring-like form, the centre of the lesion being less thickened and infiltrated. In some cases this ringed development is strikingly apparent, in others it is less so. This form of chancre is f

internal surface of the prepuce, sometimes on the glans, and again on cutaneous surfaces, particularly of the penis. The annular development of the chancre is well shown in Fig. 4, Plate XXVIII., in the large lesion. It must be remembered that the tissue within the ring is hyperplastic, but much less so than its margin.

Infecting Balanitis.—By the term "infecting balanitis" is understood a development of the initial lesion, in a diffuse plate-like form, in the mucous layer of the prepuce, and sometimes also in the superficies of the glans. This lesion usually begins as a goodly sized chancrous erosion, which spreads peripherally until perhaps the whole prepuce is involved in the hyperplastic process. The appearance of the parts is then striking. The prepuce is thickened, usually of a dull, deep red, and has a velvety excoriated appearance. Retraction of the prepuce becomes difficult and perhaps impossible. Not infrequently this condition of the prepuce coexists and merges with a circumscribed indurated nodule or nodules at the coronal sulcus or frænum. (See Fig. 1, Plate XXX.)

The Mixed Chancre.—This term is applied to certain hard chancres whose appearances have been so changed by chancroidal pus or by pus-microbes and their resulting ulceration that they resemble chancroids on the surface, while they present more or less distinctly the induration of the specific lesion. It is important to diagnosticate correctly these hybrid chancres from chancroids complicated with much subcutaneous œdema. (See Fig. 4, Plate XXIX.)

NATURE OF THE SECRETION.

The **secretion** of the syphilitic chancre is serous in character, and its sero-purulence or purulence is due to adventitious causes, such as irritants of various kinds. There is every reason to believe that much of the destructive metamorphosis of chancres is engrafted upon them by pyogenic microbes. Indeed, in many instances we see not only syphilitic infection from a chancre, but also pyogenic infection. The immaturity of the newly organized cells renders their existence precarious, and in consequence we frequently see on the surface of chancres molecular decay or gangrene. This form of decay also has its origin in the strangulation of the capillaries by the closely packed new cells, the result of which is necrosis limited to the parts supplied. This strangulation of the vessels is an important factor in the phagedena which sometimes attacks hard chancres.

After healing and absorption the chancre usually leaves a more or less well-developed scar, which is generally depressed, and sometimes it is nodular. In many cases, however, no trace of the chancre is left.

PLATE XXIX.

FIG. 2.

FIG. 1.

FIG. 3.

FIG. 4.

UNUSUAL FORMS OF CHANCRE.

FIG. 1.—Multiple ecthymatous chancres.
FIG. 2.—Multiple and intrapreputial chancres and specific lymphangitis.
FIG. 3.—The beefsteak chancre.
FIG. 4.—Mixed chancre.

GENERAL DESCRIPTION OF THE FULLY DEVELOPED INDURATED CHANCRE IN THE MALE.

A study of the following figures in connection with the description given in the text will convey a very clear idea of the salient features of

FIG. 125.

Hard chancre of the balanopreputial fold.

hard chancres which have healed and have become true indurated nodules or plaques: In Fig. 125 a well-developed hard chancre of the mucous

FIG. 126.

More salient hard chancre of the balanopreputial fold.

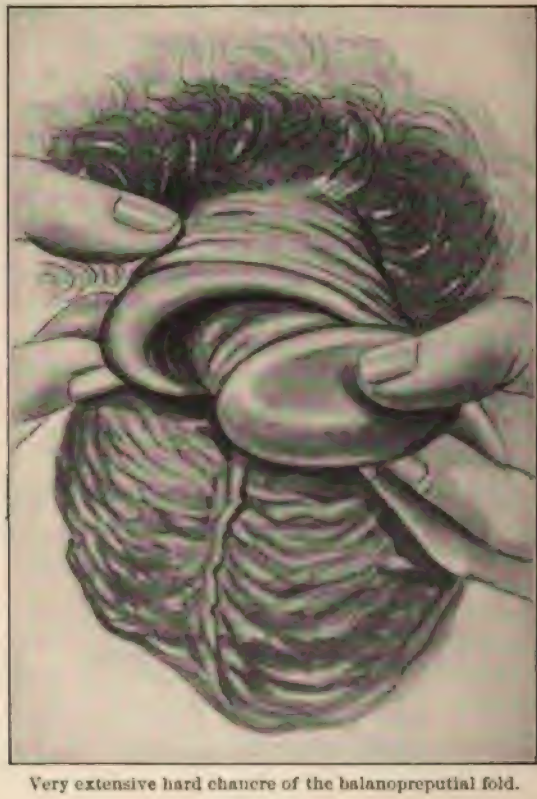
membrane of the balanopreputial fold is well shown, while in Figs. 126 and 127 more pronounced types are strikin

In Fig. 128 a large plaque of indurati r penile

hard chancre, namely, on the mucosa of the prepuce beginning on the balanic sulcus, which sometimes causes both phimosis and paraphimosis, will be readily recognized.

The tendency of the hard chancre in many cases to develop into an annular nodular patch is well shown in Fig. 129. The rather infrequent development of the hard chancre of the integument of the penis into a

Fig. 127.



Very extensive hard chancre of the balanopreputial fold.

well-marked indurated nodule or plaque is portrayed in Fig. 130, in which the initial lesion began as an ecthymatous chancre.

DURATION OF THE CHANCRE.

The duration of the initial lesion of syphilis is very variable, and depends largely upon the extent and density of the new growth. In some cases it is so slight and insignificant that it comes and goes without its presence having been known or without leaving a trace. This anomaly is sometimes seen in women, less commonly in men. The tissue forming the primary nodule, being of unstable nature, is pecu-

liarly susceptible to the action of mercury, under which it can often be seen, as it were, to melt away. So that if the chancre, as it often does, exists until the evolution of secondary lesions, it usually disappears quite rapidly under the influence of systematic treatment. But in some cases it is very voluminous and persistent, and may exist for months. Those

Fig. 128.

Large plaque or nodule in typical site, with two as yet unhealed chancrous erosions.

oft-quoted cases in which it is said to have lasted years were in all probability instances of fibroid cicatrices resulting from chancres. I have seen many of these which had been regarded as persistent and permanent indurations, whereas the syphilitic neoplasm had vanished years before and was replaced by firm fibrous tissues.

LOCATION OF THE LESION.

Chancres of the Urethra.—Chancres may be seated on one or on both lips of the meatus, but they most commonly involve the circumference of the urethra. In some cases there is no ulceration of any degree, the lips of the meatus being scarcely redder than normal, and the only appreciable morbid process being the condensation and induration of the parts. Induration here is usually very well marked.

Fig. 129.

Nodular annular chancre of the frænum.

Sometimes one lip of the meatus and the wall of the urethra feel as if formed of a thin plate of ivory. This same condition is often found in both lips. Then, again, a distinct, hard nodule may be felt at the distal end of the urethra. Chancres at the meatus may be of the form of chancrous erosions or they may present the typical cream-green tint, which may become of a deep, dull green or even of a greenish-black color. A diagnostic mark of much importance in this form of chancre is the purplish-blue color of the glans in a halo-like form. This is well shown in Fig. 8, Plate XXVIII.

Chancres of the fosss navicularis and of the deeper parts begin painlessly, with gluing of the lips of the meatus as their first symptom. Soon there is slight pain as the urine first passes, and the patient dis-

FIG. 130.

Ecthymatous chancre of integument of penis with much induration.

covers a thickening of the tissues at the site of the chancre. The discharge is sometimes mucopurulent, but may be decidedly purulent, and as considerable in quantity as in ordinary gonorrhœa. This is due to

the fact that the lesion sets up a urethritis of the contiguous membrane. External palpation shows that the corpus spongiosum is converted into a hard, tender, circumscribed nodule, which gives pain on urination and on erection of the penis. With the endoscope we observe rigidity and erosion of the urethral walls, which have a grayish-red color.

Chancres of the Scrotum.—In somewhat rare cases chancres appear on the scrotum, usually on its anterior or lateral portion, rarely on the back part.

The initial lesion in this locality is, as a rule, of goodly size, varying between that of a three-cent silver piece and that of a quarter-dollar, sometimes even larger. Two varieties of lesion are commonly met with —the chancrous erosion and the encrusted chancre. The lesion is round or oval, somewhat elevated, having a smooth, flat, velvety surface when of the erosive type, and being somewhat concave or saucer-shaped when of the encrusted type. The false membrane which covers scrotal chancres is of the grayish-green color already described, but it may become yellowish or brown, or even black. (See Plate XXX., Fig. 5.)

Chancres of the Anus.—Chancres are found beyond the anal ring, at its margin, and within the ring as far up as an inch and perhaps farther. These lesions in this location do not usually present clearly cut features. Outside the anal ring they may be oval or round or of irregular outline. They are of a pale rose, sometimes red, color, covered with a slimy secretion, and perhaps creased or fissured. Within the anal ring they are usually found to consist of sluggish, hardened fissures. These are, however, less painful than simple fissures—a diagnostic point of much importance. A further point is that in this form of chancre there is marked enlargement of the inguinal ganglia.

Chancres of the General Integument.—Chancres appearing on parts other than the genital organs are called extragenital chancres, and are mostly found on the face, the neck, the arms, the fingers, the hypogastrium; in fact, they may be found on any part of the body. They begin as a small, dull-red papule with more or less scaliness, which, if situated on parts in coaptation with another surface of integument, becomes a chancrous erosion, and in that form runs its course. Usually these chancres become encrusted. Chancres of the general integument run a chronic, indolent, painless course, and may last many months before healing. They usually give rise to no painful symptoms, and early in their course they have no concomitant phenomena except the painless enlargement of the lymphatic ganglia of the region upon which they are developed. When they finally undergo resolution they leave pinkish, brownish-red, and brownish-black pigmented spots, with

more or less atrophy and cicatrization of the skin, which last for a long time.

Chancres of the Finger.—These chancres are found most commonly among surgeons, obstetricians, dentists, midwives, and nurses, male and female. In these individuals the infection is usually contracted in operations either upon a newly made cut or an abrasion, excoriation of the skin, or upon some simple lesion present upon the skin, as, for instance, eczema and dermatitis due to the use of antiseptics and irritations. Among the laity chancres of the fingers are not very common, and they are usually the result of libidinous toying with the genitals of an infected woman. Finger-chancres also sometimes result from the bite of a person having syphilitic lesions in the mouth, and they have been known to follow a blow received upon the mouth of a person suffering at the time from specific lesions.

THE EXCORIATED OR EXULCERATED NODULE OR MASS.—This is the most common form of chancre of the finger. It is, as a rule, found near the tip of the finger. It usually begins as a small pustule, a minute excoriation, or as a fissure or hang-nail. The cell-growth increases rapidly, and the lesion in its early days is indolent and painless. In a few weeks the chancre becomes fully developed into a large, fleshy, smooth or granular, or even lumpy mass of dull-red color, sometimes with a purplish tinge. There may be density in the morbid tissue, but certainly no typical induration. Very often the chancre is soft and pulpy. These chancres, being exuberant in development, produce much deformity in the parts affected. Their shape depends on the site upon which they are developed. They are sometimes the seat of severe and continuous pain.

THE FUNGATING CHANCRE.—This form of finger-chancre develops usually on the pulp of the organ and around the last phalanx. A warty or decidedly papillomatous mass, sometimes of much exuberance, is produced, which is indolent in its course and presents sometimes a very deep-red color, and not uncommonly a purplish-red color, sometimes tinged with gray.

THE PANARITIUM-LIKE CHANCRE.—This chancre usually begins in the integument of the nail-margin in a cut or fissure or hang-nail or some inflammatory lesion. Soon an excoriated spot forms, which may be localized to one part of the nail-margin, or this latter may be wholly involved. When fully developed we find an encrusted or exulcerated swelling of more or less extent. The surface frequently becomes covered with a yellowish-green or dark-green membrane, and the thickening of the chancre extends to the parts beyond. This lesion is frequently attended with severe pain during its very chronic course. (See Plate XXX., Fig. 6.)

Usually the epitrochlear ganglion in anatomical association with the affected member is enlarged, often to a considerable size, varying from that of a nutmeg or that of a pea to that of a horse-chestnut. Sometimes there is no perceptible enlargement of the epitrochlear ganglia, in which event those of the axillæ are much swollen. There is usually swelling of the axillary ganglia concomitant to that of the epitrochlear ganglia.

In some rare cases the swellings of the epitrochlear and axillary ganglia go on to suppuration.

Cases of syphilitic infection of patients by surgeons, obstetricians, and midwives having chancres on their fingers are not at all uncommon.

In some rare cases chancres of the finger become contaminated with infectious material and more or less severe pyæmia or septicemia complicates the case.

The scaling papule or tubercle is the rarest of all forms of finger-chancre. It is usually found on the dorsal surface of a phalanx, and sometimes on the sides and palmar surface of the fingers.

Chancres of the Lip.—Chancres of the lip are quite common. They are usually seated on the vermilion border, sometimes on the inner border, and again on both the vermilion border and the skin. They may be seated on the cutaneous portion of the lip alone. These chancres are rarely seen early in their course, since their nature is frequently unrecognized until they have reached full development. They begin as small round or oval excoriations or as fissures, and are at first looked upon as cold sores or cracks of the lip.

It sometimes happens that a minute excoriation or small fissure will run a very ephemeral course, and disappear in a week or ten days without having or leaving after it any induration. In these cases the only early sign of syphilitic infection is the marked enlargement of the submaxillary and sublingual glands, which may be so extensive as to constitute a temporary deformity. But in most instances chancre of the lip goes on to full development, producing a raw, eroded, flat plaque or nodule whose shape is in conformity with the arrangement of the parts, or an encrusted lesion is produced. (See Plate XXX., Fig. 1.)

Chancres of the Tongue.—These chancres have not clearly marked features. They appear as tolerably well-circumscribed nodules either at the tip or on the lateral portion. Their surfaces are red, eroded, sometimes covered with a milky pellicle, frequently uneven and traversed by minute fissures. Their nodular character, chronic indolent course, and external features point to their nature. The submaxillary glandular enlargement aids in making the diagnosis. It must be remembered that cancer of the tongue begins in a little nodule, perhaps warty in appearance, and is soon complicated by glandular enlarge-

PLATE XXX.

EXTRA-GENITAL AND UTERINE CHANCRES.

ment. In persons under forty or fifty years it will generally be found that the tongue-lesion is of syphilitic origin. In middle and advanced age the probabilities are that the lesion is cancerous rather than syphilitic.

Chancres of the Gums and of the Hard Palate.—These lesions are very rare, indeed, and several cases reported as such were undoubtedly those of hypertrophic mucous patches. The surgeon should be cautious before pronouncing as chancre localized red thickening of the mucous membrane of these parts. When present these chancres are simply hypertrophied chancrous erosions, the so-called ulcus elevatum. Owing to the condition of the parts, it is difficult to determine the extent of the induration. As a rule, these lesions cause little trouble and are attended with scarcely any pain when unirritated. When seated near the margin of the gums they may be attacked by ulceration.

Chancres of the Tonsil.—These chancres are rather common. The frequency to-day of the tonsillar chancre is due to the fact that its existence is now well understood and surgeons are on the lookout for it.

The tonsillar chancre never presents a definite, typical appearance, since the tissues upon which it is seated differ in each individual. Whatever may have been the conformation of the parts, whether moderately smooth or more or less anfractuous, so will the chancre-lesion be but an exaggeration of that condition, due to hyperæmia and hyperplasia of the parts. Examination is difficult in all cases, particularly so in some. When accessible to the finger-tip, the tonsil-chancre will feel hard, brawny, and may even be cartilaginous. In some cases the new growth is tolerably well circumscribed; in others it is quite diffuse, involving a whole tonsil and some of the tissues around it. The surface of the chancre may be simply red and superficially eroded; it may be covered with a milky-looking membrane, resembling a mucous patch; or a dull-green membrane of considerable firmness may cover the lesion.

These chancres usually become troublesome early in their course. The patients complain of pain, uneasiness, and of difficulty in swallowing. Sometimes the suffering is very great. Then the submaxillary, sublingual, and lymphatic ganglia swell up, so as to produce large-sized bunches in the neck. These by their size impede motion and deglutition and add materially to the patient's suffering. These ganglia become matted into hard, firm, indolent masses. In some cases the pre-auricular ganglia are enlarged.

Chancres of the External Ear.—Chancres of the ear are very rare. The parts which have been found to be affected are as follows: the auricle, the lobule, the integument over the mastoid process, and the base of the tragus. Chancres of the ear are of the dry, scaling, erosive, or encrusted forms.

The pharyngeal orifice of the Eustachian tube has been found the seat of chancre resulting from catheterization by means of instruments soiled with syphilitic material.

Chancres of the Eyelids.—These chancres are not common, although many cases are reported in literature. They are found on the free margin of either lid or the adjacent integument, and also on the inner surface of the palpebral mucous membrane. They are usually of the erosive type, with either slight or decidedly marked induration, which, however, does not spread much around the original lesion. Fig. 3 of Plate XXIX. gives a very clear picture of these palpebral chancres. The creamy-green color of the membrane covering the chancre is well shown.

Chancres of the eyelids are always accompanied by painless hard enlargement of the pre-auricular ganglia, and generally by marked enlargement of the cervical ganglia of the corresponding side of the face.

GENITAL AND EXTRAGENITAL CHANCRES IN WOMEN.

Chancres of the genital organs are very common in women, but extragenital chancres occur in them much more frequently than they do in men.

Chancres in women are usually far less regular in their course than they are in men. In many women the chancre is so small, benign, and ephemeral that it may never be seen, or, if seen, its nature is usually not suspected. In very many cases, even when the lesion is strikingly apparent, its nature remains for a long time in doubt, owing to inflammatory complications and to a want of striking individuality in the lesion itself. Then, again, simple inflammatory processes and chancroidal ulcers often become upon the female genitals so hyperplastic in appearance that they may resemble specific lesions. In women induration as a symptom is not so generally observed as in men. In some females it can scarcely be appreciated by careful examination, and it may be very transitory in its duration, whereas in others it attains large proportions, lasts for indefinite periods, and may lead to ultimate deformity. In men the chancre is readily examined. In women this lesion, owing to the nature and inaccessibility of the parts, is very difficult of examination except on protruding portions of the genitals.

In the majority of cases there is but one chancre, but in fully one-third of the cases the lesion is multiple. There may be two or three, and rarely more than eight, infecting chancres in one woman.

The main reason why chancres in the female are so little understood, are so frequently unrecognized, and generally offer so much difficulty in

PLATE XXXI.

FIG. 1.

FIG. 2.

FIG. 3.

CHANCRES IN WOMEN.

FIG. 1.—Chancrous erosions.

FIG. 2.—Chancrous erosion of the fourchette, with deep induration.

FIG. 3.—The elevated papule or tubercle ulcus elevatum.

diagnosis is that there is little opportunity for their study on a large scale.

The Chancrous Erosion.—The most constant early appearance of the syphilitic chancre in women is seen in the form of an erosion of the mucous membrane. In its very early days this lesion presents no well-marked characteristics, and is very liable to be mistaken for a ruptured herpetic vesicle, an abrasion, chafe, or scratch. Such is its seemingly benign, superficial, and aphlegmasic character and small size that its nature is frequently not determined at the first examination. (See Plate XXXI., Figs. 1 and 3.)

The chancrous erosion is always found on the surface of the mucous membrane. It begins as a red spot, somewhat deeper in color than the mucous surface on which it is seated. It is very rarely, if ever, seen in women during the first few days of its existence, for the reason that its presence is usually unknown to its bearer, or, if it is seen by her, it appears so harmless that its nature is scarcely ever suspected.

The Scaling Papule or Tubercle.—This lesion is found upon the outer surface of the labia majora; upon the labia minora when they are long and their structure resembles that of the integument; upon the prepuce of the clitoris when it is long and protrudes from the vulva; upon the internal surface of the thighs, the inguinal folds, and the hypogastrium. It begins in a very insignificant manner as a small, dull-red papule, which may be scaly. This lesion increases circumferentially, but usually does not become much elevated. As it grows it develops into a flat, brownish-red and sometimes purplish-brown, perhaps scaly, elevation of the skin, with a sharply defined margin.

The Elevated Papule or Tubercle (Ulcus Elevatum).—This chancre presents the appearance of a circumscribed, flat or elevated lesion whose surface is similar to that of the chancrous erosion. Indeed, it may be defined as a chancrous erosion in which the hyperplastic process has been very active and productive of much infiltration. Cases not infrequently present themselves in which we can watch the development of the ulcus elevatum from the chancrous erosion. (See Fig. 2, Plate XXXI.)

The Incrusted Chancre.—This chancre is not uncommonly found upon juxtapudendal cutaneous surfaces, and indeed upon any portion of the integument. It has been stated that incrusted chancres are, as a rule, not found within the area of the mucous membrane of the vulva, but that their habitat is the tegumentary structures. It is true that in most instances vulvar chancres are of the erosive or papulotubercular variety. This is largely due to the fact that the coaptation of the parts and their moisture, aided very often by pathological secretions, cause

any surface-covering of the chancre to disappear. (See Plate XXXII., Figs. 1 and 2.)

The Indurated Nodule.—This chancre, so common in men, is very rare in women. In men the syphilitic neoplasm or nodule, as a general rule, becomes circumscribed into a little mass; in women this new growth tends to diffuse itself into the soft mucous tissues. Thus it is that we rarely see the indurated nodule in the female sex, except on parts where the skin and mucous membranes fuse. (See Plate XXXII., Fig. 3.)

The indurated nodule is seen as a sharply circumscribed mass of indurated tissue, which may be broad and flat, or it may have a narrow base, sloping edges, and flat surface.

Chancres of the Vagina.—These are very rare, and are usually within an inch of the vaginal ring. They are found on the anterior and posterior walls in the form of erosions with considerable hardness or in the incrusted state. Usually there is but one chancre; sometimes there are two.

Chancres of the Os Uteri.—These lesions are seated either on the anterior or posterior lip of the uterus, perhaps more frequently on the former than the latter. On these sites they may extend up the inner surface of a lip, even into the uterine cavity. In some cases the chancre surrounds the os and involves a portion of the inner surface of the lip. As a rule, but one chancre is present; rarely two are seen. (See Fig. 4, Plate XXX.)

Chancres of the Breast.—Chancres are found upon the female nipple, upon its areola, and rarely upon the integument beyond the areola.

These chancres are of the erosive and incrusted types, and sometimes they exist as indurated fissures.

Upon the nipple the chancre forms a flat plaque of varying size or a distinct nodule involving part or all of the appendage. When the woman does not give the breast to her child the chancre shows a tendency to become incrusted, but during nursing moisture keeps the parts in an eroded condition.

Chancres very commonly form in the furrow at the base of the nipple, and then they assume shapes resembling segments of circles, and sometimes they are completely circular in form. These chancres are most commonly of the incrusted variety.

Chancres of the areola are usually small round or oval erosions, sometimes flat, again elevated; or they may be saucer-shaped and slightly depressed below the normal plane. Very rarely do these chancres become incrusted. In this situation it is common to find six or eight, or even as many as sixteen, of these chancres. In some cases the lesions are found on both breasts.

PLATE XXXII

FIG. 1.

INCRUSTED CHANCRE AND CHANCROUS EROSION.

FIG. 2.

INCRUSTED CHANCRE.

FIG. 3.

INDURATED NODULE.

CHANCRES IN WOMEN.

RELAPSING INDURATIONS (ALSO CALLED PSEUDO-CHANCRE INDURÉ, CHANCRE REDUX).

The genital organs and any part of the integument or mucous membranes upon which the initial lesion has existed may at any time in the course of syphilis be the seat of recurring indurated nodules, which are liable to be mistaken for primary lesion.

There are two kinds of these relapsing indurations—the superficial and the deep. The superficial induration is in every respect like a true chancre, consisting of a localized infiltration, somewhat elevated, having a smooth exulcerated surface which secretes a scanty mucous fluid. It generally appears upon the mucous layer of the prepuce or upon the glans in the form of a small papule. It runs an indolent course, and may attain a large size. It may be accompanied by enlargement of the inguinal ganglia if it appear within the first and second years. It sometimes appears exactly on the seat of a former primary lesion, and is generally solitary. It may also develop upon a herpetic lesion, or an erosion, or a fissure. It is not uncommonly seen as a localized thickening of mucous membrane the surface of which is intact. These superficial relapsing lesions are sometimes very rebellious to treatment, both external and internal—a feature in marked contrast with what occurs in the initial lesion.

These superficial relapsing indurations in some rare cases recur from time to time at intervals of months and of a year or two.

The deep relapsing induration occurs in the submucous connective tissue of the prepuce and of the labia majora. It consists of a sharply defined nodule of cartilaginous hardness, freely movable, and generally not adherent to the mucous membrane. Its growth is rapid, and it sometimes reaches the size of a nutmeg. There may be several of these tumors, and I have seen five in one case. The lesion may remain inactive for a long time, causing no pain, but giving some inconvenience in coitus. In some cases it contracts adhesions with the surrounding soft parts; exceptionally, it undergoes necrosis and forms a deep ulcer which is difficult to cure. In women the infiltration is often extensive, involving, perhaps, the whole labium. The induration is very marked and often persists for years. In rare cases the lips and labia minora are involved. There is usually no enlargement of the inguinal ganglia with the deep induration, either in men or in women.

These indurations may occur as early as the first and as late as the tenth year of syphilis. They are amenable to early treatment, but become obstinate with age. They have been known to undergo spontaneous involution and to relapse after complete cure. It is important to distinguish them from primary lesions of syphilis. Many of the re-

ported cases of reinfection have no doubt been examples of relapsing induration. In practice these relapsing lesions are found more frequently in men than in women.

TREATMENT OF CHANCRE.

It can now be stated with positiveness that syphilis cannot be aborted by early cauterization or excision of the chancre nor by the removal of the inguinal ganglia, and that early and energetic mercurial treatment beginning with the appearance of the chancre is powerless to prevent infection of the system.

When seen at a very early date upon the male genitals the chancre usually appears as a minute round or oval excoriation or as a papule with a scaly or oozing surface. So much does this, the earliest of all evidences of syphilis, resemble simple benign lesions that mistakes are very liable to occur, and a chancre may be diagnosticated as an excoriation, an abrasion, or as a simple inflammatory papule, or *vice versâ*. Under these circumstances the physician cannot be too careful and guarded in the diagnosis of any seemingly insignificant lesion upon the penis. It is well to warn a patient not to indulge in sexual intercourse for at least two weeks, by which time the nature of the lesion will be beyond question, since if it is benign it will commonly heal under simple treatment and cleanliness, and if it is an incipient hard chancre its evolution will continue and its appearance will indicate its character. It is of the utmost importance that no stimulating or escharotic applications should be made to these small lesions for very good and sufficient reasons. In the first place, if the lesion is simple in nature, burning it with acid or other caustic will not destroy it, but simply transform it into an inflammatory nodule, which may present a striking resemblance to a young hard chancre, and thus doubt and uncertainty of mind are induced or an error in diagnosis is the result. If the lesion is an incipient chancre, it is a localized specific neoplasm, which cauterization, however severe, cannot possibly destroy, but it can cause a complicating œdema which may be troublesome to cure. It may be stated as a golden rule that we must not lay violent hands on these seemingly simple and perhaps insignificant lesions. Any breach of surface, therefore, should be kept scrupulously clean by washing, and its surface covered with lint or absorbent cotton moistened with boiled or distilled water. In many cases a water dressing is sufficient, but mild sublimate solutions (1 : 1000, 2000, or 3000) may be applied, or very dilute solutions of carbolic acid. These applications may be made every two, three, or four hours. Peroxide of hydrogen (1 part) and water (6 parts) make a solution which will produce an antiseptic effect. As the hard chancre grows larger it may be treated with black

wash or with yellow wash. It must be understood that the therapeutical effect of these lotions is simply protective and slightly stimulating. They prevent irritation and ulceration by keeping the parts clean and aseptic. The chancre offers a nidus for pus-producing microbes, and when it is not large antiseptic washes are all that is required in the way of treatment.

Chancres covered with a false membrane, thick or thin, those which show a tendency to become necrotic upon their surfaces or in which a decided tendency to ulceration is seen, may not be sufficiently influenced by the foregoing applications. In these cases it is important that a decidedly caustic effect should be produced. In cauterizing hard, as well as soft, chancres, carelessness and recklessness must be carefully avoided. The lesion to be treated should first be carefully washed with soap and water, and then irrigated with a 5 per cent. carbolic solution. It should be dried and a solution of cocaine applied to it, and then it should be dried again. A more expeditious preparatory method is to sop the surface of the lesion freely with peroxide of hydrogen diluted with an equal quantity of water, then to dry the surface and apply the cocaine, and again dry the parts. As a routine application nothing is better than fluid carbolic acid or pure nitric acid. These agents should be sparingly, carefully, and not frequently applied to the surface of the sore, and not beyond it. A small quantity of cotton rolled on the end of a wooden toothpick offers the most effective and satisfactory means of application. Calomel very often acts promptly and effectively upon chancres which show a destructive tendency. It is also useful as a dry dressing on clean but indolent chancres. It is well to bear the fact in mind that this destructive treatment is only indicated in cases in which the surface of the sores is unhealthy and shows no tendency to heal. After cauterization it is necessary to apply antiseptic remedies in the powder form. It is always imperative that these lesions should be carefully washed twice a day, and the patient should be warned to destroy, preferably by fire, all linen used in the cleansing, and to be careful not to touch with soiled fingers any article which others may handle.

The efficient powders for use are aristol, europhen, antinosine, nosophen, and acetanilid. Dermatol may be of benefit in some cases. Some chancres in both men and women fail to respond to the remedies just mentioned, and then we are forced to resort to the one remedy—iodoform—which rarely is found wanting.

New remedies come and go, but this one stays by us. It may be said without fear of contradiction that for the dressing of ulcers and wounds about the genitals, male and female, there is no remedy so efficient or which has such a wide range of usefulness. Its odor is of

course, objectionable, but with care much of this inconvenience may be obviated. In the first place, the powder must be very carefully and sparingly put on the surface, and not allowed to fall on sound parts or upon the clothes. Then, if the lesion is under the prepuce, the odor may be kept at a minimum by packing cotton in the preputial orifice. If the lesion is on an uncovered part, it should be enveloped in absorbent cotton and then covered with gutta-percha tissue. A little care and ingenuity will do much to dissipate a patient's disinclination or repugnance to the use of this drug. Though many drugs have been recommended as having the power of deodorizing or disguising the odor of iodoform, none, in my judgment, has proved successful. By far the best deodorant is cumarin, which in small quantities may be added to iodoform. It must always be remembered that this powder is applicable only to unhealthy and necrotic surfaces, and that when a smooth healing surface has been produced its use must be discontinued and one of the simple stimulating or antiseptic lotions or powders should be substituted.

Such is the satisfactory action of some of the new antiseptics mentioned that the use of black or yellow wash is becoming less frequent. These remedies will certainly clear up the ulcerated surface of many chancres, but it is always best, if we can, to produce this result with dry dressings.

It must not be forgotten that the main benefit of all antiseptic remedies for chancre consists in their power of preventing ulceration, and by this means they hasten the cure. It is important, however, that a specific action should be brought to bear on all chancres which show a tendency to become indurated. Having by the proper means produced a healthy surface, the chancre should be treated with mercurial ointment. The surface having been washed and rendered as nearly as possible aseptic, a layer of absorbent cotton or lint well smeared with this ointment should be placed upon it, and kept in constant apposition. It is important that the dressing should be renewed two or three times a day.

Chancres in women require the same general treatment as for those in men. In many cases they run their course and disappear without treatment and perhaps without recognition. In some cases, however, they are obstinate and persistent, and require time and care for their removal. It is always imperative that the vagina and vulva should be kept particularly clean in women having syphilitic chancres. They should use frequent irrigations of hot water to which borax, alum, sulphate of zinc, or carbolic acid is added. Then the parts should be kept as dry as possible, for which purpose tampons of absorbent cotton are very effective. In some cases extensive and troublesome indurating

œdema becomes a complication of the vulvar chancre, and its presence means a long siege of annoyance and perhaps suffering. When possible, chancres in the female should be dressed with mercurial ointment in the manner described above. If the induration is extensive or if it shows a tendency to spread, it is well to cover the chancre and a liberal area of the parts around it with the ointment. In some cases a strong calomel or white-precipitate ointment may be used in place of the mercurial ointment. In some ulcerative cases aristol and iodoform may be required. It is well also to use the other antiseptic powders already mentioned, since they may be of use in women.

CHAPTER XXIX.

PRIMARY SYPHILIS.

LYMPHANGITIS AND ADENITIS.

Induration of the Lymphatics.

THOUGH for brevity, and largely on account of its general acceptance, I use the above term, it is well to remember that in syphilis the chancre is first formed, and from this focus the infection promptly travels up the perivascular lymph-spaces which surround the vessels. Therefore, to be strictly and scientifically accurate, this condition is a syphilitic hyperplasia of the perivascular lymph-spaces, a periphlebitis, and a periarteritis.

Specific enlargement of the lymphatics is characterized by three important symptoms—viz., induration, absence of inflammation, and persistency.

The indurated vessel feels like a hard cord running from the neighborhood of the chancre toward the pubes along the upper surface of the penis in the course of the dorsal vein and artery, or, in a few instances, it occupies the side of this organ. It is generally single, but sometimes multiple; of the size of a crow-quill or goose-quill; in some cases of uniform diameter, when it communicates to the fingers a sensation like that of the vas deferens, while in others it is swollen at regular intervals like a necklace, or is, as botanists would say, moniliform. The distal extremity arises in the induration surrounding the chancre, and the cord can generally be traced for two or three inches toward the pubes, sometimes to the base of this prominence, but rarely as far as the indurated ganglia in the groin.

Induration of the lymphatics appears about the same time and in the same manner as that of the base of the chancre, and the two generally correspond in degree of development. The former is less constant than the latter, but if sought for may be found in a large proportion of cases.

Induration of the lymphatics usually undergoes resolution about the same time as that of the chancre, but in a few instances it becomes inflamed and terminates in suppuration, when fistulous openings may form along the course of the vessel. In these cases there is usually a complicating infection of the chancre by pus-microbes, and an active suppurating process results which spreads to the lymph-spaces.

It is always well to cause patients to rub mercurial ointment into

hyperplastic syphilitic lymphatics and ganglia as soon as general manifestations show themselves. Such a course materially aids in curing the syphilis. In case the lymphatics are swollen, lint smeared with mercurial ointment should be wrapped around the penis and kept there night and day if practicable.

Adenitis.

In every case of hard chancre the neighboring ganglia become indolently enlarged, and in many instances the lymphatic vessels are involved in a similar change. The enlargement is sometimes appreciable as early as the fifth day after the appearance of the sore, and, as a rule, between the seventh and the tenth days. In rather exceptional cases well-marked induration may not be felt until the fourteenth day, rarely later. At first, it is usually more pronounced on the same side as the chancre. Later on, both sides are involved, though the enlargement is sometimes unilateral. The hardness of the ganglia is peculiar in its density and painlessness. They are freely movable, and feel under the skin like almonds or little round tumors, which do not usually adhere to one another or to the overlying integument. Sometimes one ganglion becomes much larger than the rest, and exceptionally a number become blended into an indolent mass. In somewhat rare cases one ganglion in a chain seems to be spared; thus in chancres of the finger the epitrochlear may not be appreciably enlarged, while the axillary ganglia may be much swollen.

It will generally be found that those ganglia in immediate anatomical relation with the seat of the chancre are usually the ones which are most swollen. Induration of the inguinal ganglia may affect one or both sides. In the former case it is usually the side upon which the chancre itself is situated, although occasionally this rule is reversed, as with buboes attendant upon a chancroid.

Wherever, as in the groin, a number of ganglia form a group, most of them, at least, are usually involved, but to an unequal extent. A "pleiad," as it has been called, or a rosary-like arrangement, of small olive-shaped or globular tumors, is felt, cartilaginous in hardness, freely movable upon each other and the surrounding tissues, and without attachment to the overlying integument. One is commonly developed more than the rest, and attains about the size of an almond; the others, as large as a bean or cherry, surround it like satellites.

There are no symptoms of acute inflammation. The change has taken place insidiously and often without the patient knowing it. The skin is not altered either in color or temperature. Firm pressure sometimes reveals slight tenderness, but rarely excites severe pain, and motion is usually not impeded.

Less frequently, only a single tumor is felt in the groin, varying in size and shape in different cases: sometimes it may be compared to a good-sized plum, while at other times it is elongated, about the thickness of the finger, and corresponds in direction to the inguinal fold. In some instances as the tumor subsides it resolves itself into several, showing that it was composed of a number of coherent ganglia held together by a mildly proliferative peri-adenitis.

When a chancre is situated at a distance from any group of ganglia, as upon the fingers or face, only one or two of these bodies are usually involved.

Induration of the ganglia usually reaches its full development in the course of a week or fortnight.

These swellings are sometimes called syphilitic buboes.

Diagnosis.—In general, the diagnosis of syphilitic adenitis is easy when this condition is studied in connection with the chancre. It is sometimes observed that a man has a sore of doubtful appearance and with unsatisfactory history, and in connection therewith there is indolent enlargement of the inguinal ganglia, perhaps bilateral, which the patient claims has been present for years. In such instances a prompt diagnosis cannot be made, but in the course of a week or two the nature of the affection can be determined.

In some corpulent subjects it is often very difficult to make out clearly the condition of the inguinal ganglia. This same result may also be observed in some rare cases in which the fascia and connective tissues are so compact and unyielding that thorough palpation cannot be practised.

In forming estimates of the condition of the inguinal ganglia it is always well to remember that other morbid conditions besides syphilis may cause them to become indolently swollen. Thus, after the subsidence of gonorrhœal adenitis the ganglia may remain hard, firm, and more or less enlarged. Eczema, psoriasis, phtheriasis, and all inflammatory diseases of the skin, when they attack the legs lead to painless or painful enlargement of the inguinal ganglia.

Resolution without suppuration is almost the constant termination of syphilitic induration of the ganglia. When, however, the chancre has been attacked by pyogenic microbes—and this is more common when phimosis has been produced—a suppurative adenitis sometimes results, which may be chronic or may be very acute and present the same features as chancroidal bubo. It is not uncommon in suppurating syphilitic adenitis in the groin to find a diffuse bed of suppuration in which are scattered many hyperplastic and much-swollen ganglia.

Treatment.—Mercurial ointment should be well rubbed into the skin over the hyperplastic ganglia every day. The same treatment is necessary for the lymphangitis.

Generalized Hyperplasia of the Superficial and Deep Lymphatic Ganglia.

With the generalization of the syphilitic infection the superficial and deep lymphatic ganglia of the whole body become indolently and painlessly swollen. Though this condition is spoken of as essentially belonging to the secondary period, there is no doubt that the tissue-changes which take place in the ganglia begin quite early in the secondary period of incubation, and they become mature at the time of onset of other secondary lesions. The ganglia which are most accessible, and therefore important in a diagnostic point of view, are the anterior and posterior cervical ganglia, situated anteriorly and posteriorly to the sternocleidomastoid muscle, the occipital ganglia, those over the clavicle (on either end), and on the margin of the pectoral muscles, the anterior and posterior auricular or the mastoid ganglia, the epitrochlear at the elbow-joint above the internal condyle, and the axillary ganglia. All of these ganglia become swollen in secondary syphilis as a result of the essential hyperplastic process produced by the virus. In some cases the ganglionic reaction is rendered more intense by the presence of irritated syphilitic lesions or by inflammatory skin-lesions which may be developed on the regions of the body in which lymphatic radicals take their origin.

In this way the lymphatic ganglia of the neck, of the axillæ, and groin may become acutely swollen, and may then be the seat of pain. Whenever any of these ganglia go on to suppuration it is certain that a nearby pus-focus has supplied the irritating secretions or the microbes.

While hyperplasia of the superficial ganglia occurs, as a rule, in early secondary syphilis, this condition also may be observed in exceptional cases in late syphilis, particularly in persons whose nutrition has been lowered and whose constitutions have been impaired.

It is now generally conceded that the changes in the deep lymphatic ganglia are among the most frequent and most constant of the effects of tertiary syphilis. They bear the same relation to syphilis of the viscera that adenopathy of the subcutaneous lymphatic glands does to syphilis of the skin; in other words, they are its constant accompaniment. The affection of the deep lymphatic glands may, however, exist without any lesion of the viscera, just as the post-cervical and epitrochlear glands may be enlarged without an eruption upon the scalp or arms.

The glands most frequently affected are the prevertebral, lumbar, iliac, and femoral; the mesenteric glands and those of the extremities are rarely involved. The changes are various. Most frequently there is hyperplasia of the glandular elements; the gland is increased in length rather than in breadth, is friable, of soft consistency, of a red-

dish- or yellowish-gray color, its surface injected, and its substance cheesy. In other cases the connective tissue of the gland appears to be the chief seat of the lesion, and becomes indurated. Suppuration is never present, which is an important diagnostic sign between this and the affections of the glands in typhoid fever and in tuberculosis.

In the tertiary stage of syphilis the ganglia may become swollen and the seat of sclerosis or gummatous induration. The affection is very chronic.

CHAPTER XXX.

SECONDARY SYPHILIS.

SYMPTOMS AND AFFECTIONS OF THE SECONDARY STAGE.

At the expiration of the secondary period of incubation, which may be as short as forty-five days, and exceptionally as long as ninety (rarely longer) days, the secondary period of syphilis begins. This stage of the disease is also called the period of general or constitutional manifestations, and also the condylomatous stage. The teachings of pathological anatomy show very clearly that in the secondary period of incubation the infection of the whole system is going on slowly, insidiously, but effectively, until in the end the acme is reached, when general systemic manifestations and symptoms are developed.

There is a remarkable variation in the amount of systemic disturbance at the beginning of the secondary period. In many subjects no deviation whatever from the healthy standard is observed to mark the commencement of the secondary stage, and the dermal lesions are the only evidences of syphilis. These very often pass away unobserved, and as a result a hiatus in the patient's medical history is produced. In other cases, however, particularly in women, much and varied constitutional disturbance takes place. In some cases syphilis comes on abruptly, and, we may say, it explodes.

Perhaps the most constant morbid symptom is fever, which, though absent in many cases, is present in most in varying degrees of intensity. In some cases there is an elevation of temperature of from one to three degrees, commonly with a corresponding mild nocturnal exacerbation. In other cases the febrile movement is well marked, the morning temperature being from 101° to 102° F., and in the evening 104° F., and in rather exceptional instances higher, even to 107° F., particularly in women. Besides the elevation of temperature there is a corresponding acceleration of the pulse, and the respiration ratio is increased. The tissue-metamorphoses are present in proportion to the intensity of the fever.

Syphilitic fever not infrequently presents a distinctly remittent type —a peculiarity which may be noticed in the early period, but is generally not observed until late in the course of syphilis. In some rare cases of tertiary syphilis a well-marked febrile condition has been observed. It is in such cases that the incorrect diagnosis of tuberculosis may be made.

Various neuralgic pains are also complained of by patients, the peculiarity of which is their constant occurrence toward evening and at night. Headache is mostly nocturnal in character, and varies from a mild form to one in which the patient's sufferings are agonizing, in which he or she is tortured by pain during the night, and prostrate, worn out, and suffering during the day, when the pain may not wholly cease. Such patients say that their heads feel as if they were being crushed as by a vise, or as if a nail were driven into their skulls. Sometimes the pain seems to be superficial, and may affect the temporal, frontal, or occipital regions. In other cases these pains are so excruciating that the sufferer is an object of pity. These pains in the head may occur at the date of onset of general manifestations and at later periods.

Intense neuralgic pains affecting the cranial nerves, the fifth in particular, also seated in the intercostal nerves, in the sciatic and its branches, and in the anterior crural, are not uncommon. Persons, who have previously suffered from neuralgia of any part are especially liable to exacerbations during the eruptive stage of syphilis, and, in fact, at any time during the activity of the diathesis.

Insomnia is a symptom sometimes complained of by syphilitic patients, who can give no reason for it whatever, since in many cases there is no physical suffering. It is peculiar in the fact that it is not readily influenced by soporifics, but gradually ceases with the disappearance of the exanthematic symptoms under mercurial treatment.

Disturbances of the sympathetic nervous system are sometimes strongly marked, particularly in anæmic and thin persons and in women. Such patients complain of cold feet, and their hands feel like marble or ice, and they are chilled by the slightest draft.

Cachexia.

At certain periods during its course syphilis produces an adynamic condition of the system called "syphilitic cachexia." These periods are at or just before the evolution of the disease during the secondary stage and toward the close of the tertiary stage.

In these cases there may be observed, soon after the onset of the secondary stage, loss of appetite and strength, emaciation, and a pale, sallow appearance. The pulse becomes rapid, weak, and small, and the temperature rises. The patient feels dejected, nervous, and apprehensive. The condition becomes graver in proportion to the extent of the numerous functional disorders which accompany the inauguration of the secondary stage.

The cachexia of the secondary period of syphilis also may begin a few months after the onset of the disease. It is seen in weakly persons oftener than in the robust, and, again, more frequently in those who

have had imperfect or no treatment whatever; hence we have reason to infer that early and adequate treatment will prevent its occurrence. The general symptoms of cachexia, already given, are repeated in this stage of syphilis in a milder form. Frequently nothing can be found to account for the condition, and the only suspicious feature of the case is the occurrence of headache or pain, which is more severe at night.

In some cases neurasthenia is developed.

The Typhoidal Condition.

In the early months of syphilis certain grave adynamic conditions sometimes supervene, which may very properly be termed the syphilitic typhoidal state. This condition, which is not common, is usually seen in weakly and overworked or under-fed individuals, and in males more frequently than in females. Malaria and a neuropathic tendency are sometimes contributory causes. It may occur quite early in the infection coincidently with the development of the general manifestations, and at any time during the first year. It may supervene in some subjects in whom the treatment has been inefficient or wanting, and also as a result of excesses (sexual and alcoholic), and of severe bodily and mental strain.

The patient may or may not complain of headache at first, but he experiences a feeling of great weakness which soon develops into utter prostration. He has a mild continuous fever and dull frontal headache, and his pulse is rapid and small. He becomes pale and sallow, has no energy, and desires to lie down. All his senses grow to be impaired and dull, and he becomes somnolent and torpid. He has confusion of thought, vertigo, and sometimes photophobia. His appetite leaves him, and his bowels are usually slow; exceptionally there is diarrhœa. In this condition he will lie in bed indifferent to all around him, not caring for food, and sometimes having great distaste for it. In this lethargic condition he may become mildly or severely delirious, and in some cases maniacal. It will be observed, however, as a rule, that the peculiar dull, earthy tint of the face so constantly seen in typhoidal patients is not well marked in syphilitic subjects. But there is the same typhoidal facies, as shown in the utter loss of tone of the facial muscles.

Though the condition is serious, it does not commonly cause death, and it may be relieved by antisyphilitic treatment, together with care and nursing and nutritious food. The convalescence, however, is rather slow, and several months may elapse before the patient begins to gain in weight and acquires his normal physical strength and mental balance. In this condition, however, hemiplegia, aphasia, and epilepsy may supervene, and then the gravity of the case is much increased.

The **diagnosis** of this condition is usually easy if the medical history of the patient is known. The absence of diarrhœa, of abdominal ten-

derness, and of gurgling in the right iliac fossa, and of the typically pronounced typhoidal facies, will, when carefully studied, lead the physician to a correct interpretation of the nature of the case.

Hysteria.

In men, and particularly in women, a condition of pronounced hysteria may be developed in the early months of syphilis. This condition may be comprehensively portrayed by the recital of the following case, which brings out its salient features: After the onset and cessation of roseolar and papular eruptions, rheumatoid pains, and iritis, a woman, twenty-two years old, began to suffer from continuous supra-orbital pain and dizziness. Her gait became unsteady, and on occasions a sensation as if she would inevitably fall backward was felt, but was always controlled by a forced mental effort. She was emaciated, and, instead of being cheerful, as she was naturally, she was sad and despondent. Her appetite was poor, but not capricious; the bowels moved regularly, and urine was normal in quantity and as to constituents, and her menses were regular. Her pulse was 60 and small, and the temperature normal. It was noticed that she was more irascible than usual, and after such spells, which were of frequent occurrence, she often wept copiously. Then she would remain for hours in a condition of abstraction, not appearing sensible or cognizant of her surroundings. She would go away from the table when eating, imagining that she was not good enough to be in company with others. At other times she would become very suspicious, and would imagine that her friends were conspiring against her or that they were laughing at her and making sport of her. Under this impression she would become very nervous, and would shrink away and cry, and would perhaps sit for hours without moving; and if any one came near her she would, as it were, awaken from her lethargy greatly frightened and be much agitated. When spoken to she recognized those around her very readily, and was pleased to see them, and she said she felt a queer sensation in the head. When asked if she felt badly continuously, she replied that there were intervals in which she was comparatively free from the sensations, and that she tried very hard to resist them. She said she felt quite weak, that her memory was very poor in comparison to what it had been, and that in reading a book or paper she often forgot what she had read when she got through. This fact was very apparent, for she was fond of reading the sensational serials in the weekly papers, but her memory was so much impaired that she could not keep the thread of the narrative. She complained of dimness of vision, and she frequently saw *muscæ volitantes* before her eyes. She said, also, that her sleep was very much disturbed, and she frequently awoke greatly alarmed. Upon walking

a sensation of ataxia was noticed, and she said she felt uncertain as to where she was placing her feet. At this time she had nocturnal rheumatoid pains along the tibiæ and in the larger joints.

Analgesia.

Syphilis very commonly gives rise to various disorders of the general sensibility, especially in women. The most frequent of these is a loss of the perception of pain, or analgesia, with which is sometimes combined absence of the sense of touch and of temperature. In such cases, for instance, a pin may be thrust deeply into the flesh without the patient's suffering pain, and she may be also insensible to the touch of the fingers, or cannot distinguish between hot and cold objects.

Syphilitic analgesia varies in degree in different cases, and also in the extent of the surface affected. In some instances it extends from head to foot, in others it is confined to particular regions, when the extremities of the limbs, as the hands, the lower half of the forearms, the feet and ankles, the female breasts, are almost invariably involved. The back of the hand, over the dorsal surface of the metacarpus, is a favorite site, where it is likely to be found if anywhere. The disorder occurs during the early secondary period, and most commonly lasts for several months.

Disturbance in the Reflexes.

In some cases of syphilis, prior to the onset of general manifestations and during their evolution, an exaggeration of the reflexes of the skin and tendons may be observed. This condition may develop slowly or it may appear quite suddenly. Exceptionally this symptom is found in the late stage of syphilis in cases which have been improperly treated.

Synovitis.

Two forms of synovitis occur during the course of syphilis—the one simply a chronic effusion into the joint without appreciable change therein; the other, an affection in which there is, besides the effusion, a thickening of the synovial membrane.

Synovitis begins slowy and painlessly. The patient experiences slight stiffness in the joint, which is found to be swollen. On examination the usual symptoms of effusion are found, which vary according to the joint attacked. The skin covering the joint is not changed. Firm pressure may cause slight pain, and dull pain may often be felt at night, but the articular surfaces may be crowded together with impunity. The amount of effused fluid varies; in some cases it is very slight, in others copious. A peculiar feature of this affection is the intermittent character of the effusion. In some cases, particularly those who are

subjected to treatment, it passes slowly away, and the joint is apparently left in normal condition.

In other cases the affection is chronic and persistent, and the effusion disappears very slowly. In these cases we usually find the whole joint enlarged and indurated, and subject to frequent small effusions. There is no tendency to suppuration or destruction of the joint.

Precocious Osseous Affections.

The bones may be attacked in the early months of syphilis, although osseous lesions generally develop quite late. The bones most liable to early affection are those of the cranium, the ribs, the sternum, the clavicle, and the tibia.

Of the skull-bones, the frontal and parietal are most commonly attacked. The swellings vary in diameter from half an inch to an inch and a half, and reach a height of half an inch. They are round and smooth, and if slowly developed are quite hard. They may be single or multiple, unilateral or symmetrical. They may occur at the angle of junction of the frontal bone with the orbital plates or on the occipital bone, but they are usually on the sides of the skull.

The clavicle is usually affected at its external extremity, the articulation sometimes being involved. The upper third of the sternum is more commonly involved than the lower third. Occasionally its borders are attacked with portions of the costal cartilages, when the patient may complain of severe dyspnœa and pain on deep inspiration. In such a case a localized pleurisy has probably been excited. In severe cases the ribs themselves may be invaded, especially their anterior portions. Its subcutaneous surface is the portion of the tibia most frequently the seat of these tumors. They vary in size and number, but are usually not as salient as similar swellings of other bones. The radius and the ulna are also sometimes attacked. The swellings are usually near the joint, the wrist more commonly than the elbow.

These tumors may develop rapidly and are usually the seat of nocturnal pain.

Rheumatoid Pains and Rheumatism.

Some of the most constant symptoms in the early months of syphilitic infection are pains in the muscles, fasciæ, bones, and joints. These are termed rheumatoid pains, articular pains, and arthralgia; they chiefly attack the larger joints, such as the shoulder, the knee, the hip, the ankle, elbow, and wrist, and often the phalanges. The muscles affected are chiefly those of the extremities, and the fasciæ of these parts and of the large joints are also attacked. Sometimes a single muscle, and again groups of muscles, may be involved. The sensation

may be that of weakness or fatigue, of moderate soreness, and even of a dull or severe aching pain. The pains begin generally toward evening, and they may become atrocious, and even intolerable, during the night. Toward morning they usually cease, and leave a sensation of soreness and stiffness in the joint.

Acute Articular Rheumatism.

As a very exceptional feature in secondary syphilis a condition resembling acute articular rheumatism is developed, particularly within the early months of the infection. The joints chiefly attacked are the large ones, and also the small ones, which become swollen and very painful, and the skin over them coincidently becomes red and tender. As a rule, the process extends over several weeks, and even two or three months. Usually one or more joints are attacked at a time, and whenever the inflammation begins it shows a tendency to stay. It is not common in acute syphilitic rheumatism to see the inflammatory process cease in one joint and then jump to another, as it so commonly does in the simple form. In specific rheumatism heart-complications are exceptional.

The fever may be mild, but it is sometimes of quite pronounced type. There may be mild sweating, but we do not observe the drenching sour sweat of acute rheumatism. In the syphilitic form of acute rheumatism there also may be sometimes observed periosteal swellings on the shafts of some of the long bones, the tibia, fibula, and radius and ulna chiefly.

Hyperæmia and Hyperplasia of the Pharynx and Tonsils.

In many cases of syphilis, coincidently with the evolution of the secondary manifestation, a diffuse redness and thickening of the pharynx and a swelling of the tonsils may be seen. Very often patients are unaware of the existence of this local trouble. Then, again, the soreness, stiffness, and pain give rise to much suffering and inconvenience. In many of these cases there is no superficial lesion other than moderate excoriation; in some, however, mucous patches and condylomata may be present. This pharyngeal hyperæmia may be very persistent, particularly in smokers, and in some patients it is much increased by the use of mercury internally. Local treatment is very important for this condition, which should be constantly looked for.

Pleurisy.

Recent observations have conclusively shown that the pleura may be attacked early and late in the secondary period of syphilis. The affection may or may not have distinctive characteristics. In some cases

patients complain of pain in the chest-wall, which is usually limited to a space the size of one or two palms of the hand. It is not uncommon in dispensaries, and even in private practice, for patients to present themselves covered with an erythematous or papular rash, and for the surgeon to find one or more porous plasters on the chest-wall, usually about midway from the shoulders, and on either the anterior lateral or posterior surface. They may complain of soreness, stiffness, or even pain of a dull and, somewhat rarely, stabbing character. In these cases there may be no fever, or the temperature may be a little above the normal. There may be slight effusion; rarely is it copious. In some cases a mild friction-sound gives evidence of moderate fibrinous exudation.

Angina Pectoris.

This condition, with all its classical symptoms, is in rare cases seen in secondary and tertiary syphilis. It is of paroxysmal occurrence, and both mild and severe in its course, and sometimes accompanied by abnormal sensations of heat and cold or sweating on the left side of the body. It usually yields promptly to antisyphilitic treatment.

The early angina pectoris is probably due to irritative lesions in the coronary arteries, and perhaps in the cardiac plexus; the late form generally results from gummatous formations in the heart.

Hyperæmia and Hyperplasia of the Spleen.

With the evolution of secondary manifestations and symptoms, particularly in cases of anæmia and cachexia, in which the condition of the blood is much deteriorated, there will sometimes be found decided swelling of the spleen. The patients complain of a dull, heavy sensation in the splenic region, and in some cases a mild or severe pleuritic pain may be felt. This condition is usually ephemeral, and slowly subsides under antisyphilitic treatment and when the general nutrition improves.

Jaundice.

In early secondary syphilis and during the first year of the infection there is not infrequently seen a mild and ephemeral form of jaundice. This evidence of hepatic derangement may consist simply of moderate yellowness of the skin of the face, or there may be a dense golden-yellow discoloration. In case of jaundice there is usually chloro-anæmia or asthenia.

This condition is probably due to an irritative process acting upon the common bile-ducts, and not to any structural lesion.

The jaundice of secondary syphilis may last only a few weeks, but

in severe cases, particularly when treatment has not been adopted, it may last two or three months.

Albuminuria and Ephemeral Nephritis.

There can no longer be a doubt that early and sometimes rather late in the secondary stage a mild or more severe form of nephritis may occur.

It is believed by several authors that the early or precocious nephritis of syphilis has the characteristics of the same condition due to other infectious fevers and diseases, and that it is a glomerulonephritis comparable to that of scarlatina. Some authors claim that mercurial treatment causes the kidney-changes; but we have no definite knowledge on the subject.

The **symptoms** of early renal syphilis may be wanting, and the diseased condition may only be discovered upon examination of the urine. Then, again, in some cases there is œdema of the lower extremities and of the face, and perhaps there may be moderate or extensive pleural or abdominal effusion.

In many cases this nephritis is curable by antisyphilitic treatment, aided by care as to regimen and the use of a milk diet. In some cases, particularly in patients who indulge in an excess of alcoholic liquors and who are exposed to cold, parenchymatous changes are produced.

The ephemeral nephritis of secondary syphilis is to be feared, for the reason that it may lead to structural changes in the kidneys.

Temporary glycosuria and peptonuria have been recognized in some rare cases of secondary syphilis.

Hemorrhage.

Any of the secondary eruptions of syphilis may be accompanied by hemorrhagic effusion, either around or into the substance of the lesion. It may occur on the lower extremities of those whose general health is unimpaired, and is then not of serious import, or it may occur on various other portions of the body of broken-down and scorbutic persons. In all of these cases the effusion is secondary to the specific process, spontaneous transudation of blood into the skin of syphilitics being a rare occurrence.

The etiological relation between syphilis and hæmoglobinuria has not as yet been clearly made out, but there is distinct evidence that syphilis acts as a causative factor in this peculiar form of blood-degeneration.

CHAPTER XXXI.

SECONDARY ERUPTIONS, OR SYPHILIDES.

THE early eruptions of the secondary stage are distributed symmetrically and generally over the body, involving the superficial layers of the skin; the later lesions of this stage, although extensively and symmetrically spread, are less copious, and show a tendency to localization, and, moreover, invade deeper portions of the skin. The lesions of the tertiary stage are always profound and are less profusely distributed, but they involve more extensive portions of particular regions for which they seem to have a predilection, and they are frequently unsymmetrical. The course of the tertiary lesions is decidedly more prolonged and indolent than that of the secondary.

Their course, as compared with that of simple eruptions, is marked by chronicity and absence of inflammatory features. They may be accompanied by a moderate degree of systemic reaction. In some erythematous and papular syphilides of the early period of syphilis the intensity of this reaction and the active character of the eruption may render the diagnosis from one of the simple exanthems very difficult. The actual nature of the eruption is demonstrated by its quickly assuming a subacute course. With the progress of the syphilis the tendency of the eruptions to present a chronic, apyretic character is more marked. Some local exciting cause may usually be found for the hyperæmia and inflammation sometimes attending tubercular, ulcerative, and gummatous syphilides.

In strict accuracy the only purely syphilitic skin lesions are those produced by erythema and cell-changes—namely, the erythematous and pigmentary, and the papular, tubercular, and gummatous syphilides, in which, when uncomplicated, there is no suppuration. These dermal affections result directly, without complication, from specific syphilitic process. The various pustular syphilides of the secondary stage and the rupial, ulcerative, and serpiginous syphilides of the later stage are really the results of mixed processes or infections. In these cases, in some occult manner, the hyperæmia and hyperplasia of syphilis become complicated by the action of pyogenic microbes. Many so-called syphilitic lesions—namely, the impetigoform and the ecthymatous syphilides—very often present an exceedingly striking clinical picture of microbic invasion of an integument which seems susceptible to their influence,

and in which the resulting low-grade pyogenic process seems to luxuriate. (See Plate VI.)

Absence of Itching and Pain.—Owing to their indolent nature syphilitic eruptions do not, as a rule, cause any irritation of the skin.

Itching may be present in connection with an early eruption whose evolution is particularly acute. It is never so intense as in a simple eruption, and is much more ephemeral. It is perhaps more troublesome with an eruption occurring on the scalp than elsewhere, and when complicating an early rash it is generally limited to the extremities, the upper more often than the lower.

Polymorphism.—The simultaneous occurrence of several varieties of lesions in the same eruption is an important and common feature of syphilis. It is due to three causes: the chronic course of syphilides, their relapsing tendency, and the changes occurring in the lesions. Polymorphism is most frequently observed early in the secondary stage, since eruptions are then more numerous; yet it may exist even with the late tubercular eruptions.

Color and Pigmentation.—It is important to distinguish the color of the syphilides from the pigmentation which frequently follows them. Their usual tint is pinkish red, being much more subdued than that of simple eruptions. Even in exceptional cases of acute invasion, in which the color may be unusually bright, it is less intense than in the simple exanthemata. The hue soon fades to a brownish one, which after involution of the eruption changes to a copper-colored, yellowish-brown maculation. Pressure dissipates the color during the early stages of an eruption, but finally the pigmentation, which has been compared to "the lean of ham," to the color of copper, and to a combination of yellow and brown, becomes permanent.

These pigmentary changes are not peculiar to syphilis, being equally well marked in lichen planus and in cases of protracted dermatitis. They are probably due to deposit of coloring-matter of the blood in the affected spots.

Tendency to Assume a Circular Form.—The early eruptions are generally distributed over the surface without definite order, except in some instances in particular regions, where they may be arranged in a circular manner. This peculiarity is more commonly seen in the case of small papular rashes and in the erythematous syphilide. The latter often relapses in the shape of distinctly marked rings, differing from the papular syphilide, in which the bases of the papules generally merge and form wavy lines or segments of circles or perhaps complete circles. In certain large papules and in some papulotubercles involution begins at their centres, and the periphery is left in a ringed form.

The Influence of Intercurrent Diseases on the Course of Syphilides.—

The course of syphilitic eruptions is not infrequently interrupted, or even permanently arrested, by some acute disease. Numerous instances have been reported of the disappearance of an eruption at the outset of an inflammatory affection of the lungs, of acute articular rheumatism, of various adynamic fevers, and of acute cerebral disease.

During an attack of erysipelas secondary and tertiary syphilides have been observed to undergo involution; not only were the lesions in the area of the acute exanthem affected, but also those seated at a distance from it disappeared.

This healing action of erysipelas on syphilitic neoplasms is undoubtedly due to the changes produced in the tissues by the Loeffler bacillus or its toxins.

Unusual Modes of Evolution.—The appearance of a generalized eruption is looked upon as the indication of constitutional infection, but the first eruption may be limited, and a general rash may not be developed for several weeks. In some cases only two or three dermal lesions can be found at the usual date of invasion. Should the eruption be erythematous, the spots soon become coppery, and remain in a chronic condition; if papular, the papules are sluggish, and usually leave a pigmented spot. In connection with these precocious lesions the patient may suffer from syphilitic pains in the head, in the bones, etc., and perhaps may have erythema of the fauces and high temperature. Within two to six weeks the general eruption follows.

The Localization of the Syphilides.—Syphilitic eruptions are often found in regions where simple skin lesions are seldom or never developed.

Secondary eruptions appear on the scalp, and especially at its margin on the forehead, at the angles of the mouth, on the alæ of the nose, about the anus and upon the genitals, near the umbilicus, in the inguinal folds, between the toes, and upon the palms and soles. The supraclavicular and infraclavicular and sternal regions, where non-specific and parasitic eruptions are often found, are rarely the seat of specific exanthems, and on the dorsum of the hands the latter are not often seen. Regions rich in sebaceous and hair follicles are, as a rule, less frequently invaded by simple than by specific eruptions. The annular forms of simple erythema may occur on any part of the body, while these forms of the erythematous and the papular syphilides are more likely to be limited to the neighborhood of joints, the anterior and inner surfaces of the extremities, and the gluteal regions.

The papular syphilides are prone to be developed on the palms and soles.

Later eruptions are generally seated upon the nose, the lips, and the scalp; they are found upon the scapular, sternal, and gluteal regions, and more often on the legs, near the joints, than on the thighs.

The early eruptions, especially the papular syphilides, are very likely to form a segment of a circle at the border of the scalp, which has been called the "*corona veneris.*" It is a mistake to suppose that the papular eruption is the only one which may be developed in this way, since most secondary, and even tertiary, syphilides seem prone to thus develop.

Peculiarities of Ulcers and Cicatrices.—Syphilitic ulcers may be round, oval, kidney-shaped, or of the form of a horseshoe. The ulcers of lupus frequently assume similar forms, but the lesions of syphilis are generally more numerous, more extensively distributed, and more polymorphous than those of lupus. The character of the crusts, the rapid progress and regular margins of the ulcer, and its proximity to a joint, the general history of the case, and its amenability to treatment, distinguish a syphilitic lesion. The cicatrices of syphilitic ulcers, especially where they have been numerous, are often diagnostic. They are distinctly rounded or oval, smooth, and seldom traversed by fibrous bands except at the joints; they are frequently perforated with minute holes, the sites of former follicles, when they are more or less depressed, and when mature are somewhat pliable. Their brownish-red color slowly fades from the centre to the periphery, until there remains a white shining surface surrounded by a narrow areola of brown pigment.

The exact relation of herpes zoster to syphilitic infection is a question yet to be settled, though several authors entertain the opinion that the dermal nervous disturbance may in some cases be etiologically associated with the general infectious process. This subject is worthy of careful study, and until more light has been thrown upon it it is not well indiscriminately to pronounce all cases of zona occurring in syphilitics to be due to specific infection.

THE ERYTHEMATOUS SYPHILIDE.

Syn.—Syphilitic roseola, Macular syphilide, Exanthematous syphilide, Syphilis cutanea maculosa.

The erythematous syphilide is usually the earliest syphilitic eruption. It is probably present in all cases of syphilis, but may escape observation on account of the extreme faintness and delicacy of its pink spots, or its scantiness, or by reason of its forming only a part of an eruption which is chiefly papular or pustular.

The lesion consists of round or oval spots, with distinct or irregular outlines of an average diameter of about one-half of an inch. Their color varies from a delicate rosy pink to a decided red or even a purple hue. In some cases there may be only a mottling of the skin, or the eruption may be so faint as to be invisible except on careful inspection or in an oblique light. Exposure to cold brings the spots into promi-

nence, while they disappear in the general hyperæmia of the surface from increase of temperature, and show themselves more clearly in the reaction which follows. At first the spots may be effaced by pressure, but about the end of the first month they may assume a grayish-brown or coppery tint which is permanent. This tint appears earlier in exposed regions and on the legs, perhaps owing to peculiar conditions of the circulation. Sometimes the eruption disappears without this change of color. There is seldom elevation or scaling of the surfaces of the spots.

The erythematous syphilide requires a week or ten days for its complete development, but individual patches reach their full size in a day or two, and show no tendency to coalesce or to form circles. In cases of great intensity, or in those in which the capillary circulation is for any reason stimulated, the whole body may be covered by the eruption in a single day.

The spots may be first seen in the vicinity of the umbilicus, soon extending to the thorax, sometimes following the line of the ribs, and finally, in severe cases, being closely crowded over a large portion of the surface. In exceptional cases they appear first on the face. In mild eruptions the spots are most numerous on the sides of the trunk and on the inner surfaces of the extremities. On the genitals of either sex the macules are prone to hypertrophy, and hence we frequently see condylomata lata coexisting with roseolous patches in these regions. Similar changes are noticed about the anus, the umbilicus, the nose, and the mouth, and in the fold of integument below the breasts. A limited number of patches may be found on the palms and soles which may be diffuse or slightly elevated and scaly. The dorsal surfaces of the hands and feet are rarely invaded. But it is very common to see a well-marked, even intense, eruption on the palms of the hands and the soles of the feet. The spots are of irregular roundish outline of deep-red, even purplish, color, and are also found scattered on the fingers. In many cases little masses of epithelium, somewhat salient also, but deeply imbedded in the superficies of the skin, are seen scattered over the palm and the fingers, particularly near the natural furrows. This condition is admirably shown in Fig. 131. A common region is the lower two-thirds of the forearms and the wrists. The neck is frequently exempt, or an eruption on the trunk may extend by occasional spots along the back of the neck to the scalp.

The pale-rose or pinkish eruption, which so often escapes detection, is usually of ephemeral duration. The spots rarely become elevated, and more rarely the seat of scaling, and they disappear as they appeared, suddenly and quickly. It is not uncommon to see this eruption in its subdued form coexist with well-defined erythematous spots on the face, forehead, and the flexor surfaces of the arms. (See Plate XXXIII.)

PLATE XXXIII.

ERYTHEMATOUS SYPHILIDE. PALE ROSE ERUPTION.

PLATE XXXIV.

ERYTHEMATOUS SYPHILIDE. DEEP RED OR PURPLISH ERUPTION.

The second or more hyperæmic form of the erythematous syphilide usually appears by prompt and comparatively rapid invasion, and is often accompanied by marked elevation of temperature, malaise, rheumatoid pains, and neuralgias. The eruption begins as pinkish or rosy spots, which rapidly become darker until a rather deep pinkish red is observed. The irregularly and generally distributed spots are at first grayish-red, but soon assume a purplish tint. Very often with this deepening of color punctæ of even deeper hue appear at the orifices of follicles. (See Plate XXXIV.)

Fig. 131.

The erythematous syphilide of the palm, with epithelial hyperplasiæ.

This form of the erythematous syphilide is peculiar in its chronicity, since the purplish spots remain unchanged for weeks, and perhaps as long as three months. Then they gradually become grayish brown, then coppery, and finally a yellowish buff, when they disappear, the process of involution sometimes occupying several months. More or less desquamation is often observed in this syphilide from its period of development to its decline.

Circinate eruption.—In relapses of the erythematous syphilide during the first year of infection the eruption sometimes appears in the form of perfect or broken rings. This annular or circinate eruption is usually limited as to the number of the efflorescences, and is generally localized in certain regions. The rings may be quite broad or very thin, and they may be merely erythematous or they may be slightly elevated and moderately scaly. Sometimes several rings or parts of rings are

seen enclosed within a larger ring. In some cases this enclosure of rings within rings is strikingly perfect in appearance. The neck, the forearm, the shoulders, and the chest, and the thighs are the most constant sites of the annular roseolous syphilide. There may be as many as fifty and as few as three or four rings. In some cases this eruption shows a marked tendency to relapse, particularly within the first two years following infection. In very exceptional cases this form of eruption appears as late as the third, fourth, or fifth year of syphilis. In some cases the rings look like deep-seated, very dull-red mottlings of the skin, particularly where it is thin and fine. In many instances patients complain that they have these so-called ringworms for months and years. These ringed eruptions, as a rule, show no tendency to peripheral increase. (See Fig. 132.)

Fig. 132.

Circinate erythematous syphilide.

Seborrhœa and Syphilis.—In some cases of erythematous syphilide of the face, neck, and upper part of the trunk there seems to be an interlocking or symbiosis of this specific process with the seborrhœic process, which is caused by some micro-organism. The syphilitic eruption seems to follow the evolution and development of the seborrhœic process. The erythematous spots become slightly elevated and decidedly scaly, the scales having the dirty and greasy appearance of those of the simpler process. The redness is dull and of the salmon tint.

The **course** of the erythematous syphilide is slow, and except in cases of active invasion it is not attended by special irritation or heat of the skin.

Its **duration** depends on the degree of the hyperæmia and on treatment. A faint rash often disappears spontaneously within a short time under the influence of mercury. After pigmentation has taken place internal treatment needs to be supplemented by the external use of mercury in ointment, lotion, or, still better, the vapor bath.

Diagnosis.—The diagnosis of the erythematous syphilide is to be made when in its form of hyperæmic patches, its pigmented condition, and its ringed form.

In its hyperæmic stage it may be mistaken for rubeola, scarlatina, or the erythema following the ingestion of balsams or the use of mercury.

The mode of invasion, the absence of severe general symptoms, and the circumscribed and indolent character of the rash will usually enable one to distinguish it from rubeola and scarlatina; moreover, the presence of catarrhal and conjunctival symptoms in the former, and of gastric and throat symptoms in the latter, will be of assistance.

The rash caused by cubebs, copaiba, tar, etc., is always attended by high fever and serious gastric disturbance, and many of the patches are very large and œdematous or like the wheals of urticaria. The eruption soon fades on cessation of the exciting cause.

One of the most frequent errors in the diagnosis of syphilitic eruptions is that of confounding the pigmentary stains of the erythematous syphilide with tinea versicolor. They somewhat resemble each other in color, but that of tinea is more yellow, and many of its patches are very large, and they are always accompanied by some extremely small ones. Tinea is, moreover, slightly pruritic, and its scales contain the *microsporon furfor*. The patches of tinea are always found over the sternum, where syphilitic eruptions are rare, and they are much less scattered than those of the syphilide.

In rare instances of slight elevation and scaliness the rings of the erythematous syphilide may be mistaken for tinea circinata, particularly when this eruption is of a pink or red color. The scales of tinea circinata always contain the parasite *tricophyton tonsurans.*

Pityriasis maculata and circinata are sometimes mistaken for the erythematous syphilide. In the simple eruption the patches are of a decidedly more inflammatory nature. There is no history of syphilis; the ganglia are unaffected, and there are not present on the skin, mucous membranes, or scalp, as there commonly is with the erythematous syphilide, concomitant lesions whose nature is readily perceptible.

Treatment.—As a rule, internal medication causes this syphilide to disappear promptly, but it is always well to hasten its involution by sublimate baths, mercurial vapor baths, or by inunction. Upon the face, neck, hands, and wrists this syphilide may be persistent, and its disappearance may be hastened by using a 4 per cent. white precipitate ointment.

When seborrhœa complicates the erythematous syphilide it is well to rub the parts several times a day with resorcin ointment (5 to 10 per cent.).

THE PAPULAR SYPHILIDES.

These most important dermal lesions of syphilis are made up of circumscribed infiltrations into the superficial layers of the skin, and present two varieties—the *conical* or *miliary* and the *lenticular* or *flat*.

They may constitute the first symptom of the secondary stage, or they may be combined with the erythematous syphilide. In relapses they frequently occur alone, or constitute by far the larger proportion of a recurring eruption. They may be seen even in the tertiary stage, and they merge into the tubercular syphilide by intermediate grades of papulo-tubercles. Some of these intermediary papules are attended by an epidermal proliferation, and have therefore sometimes been erroneously called "squamous syphilides." The various changes of form and distribution which the papules undergo sometimes give them a strong resemblance to simple skin lesions.

The Miliary Papular Syphilide.

The *miliary papular syphilide* exists in two distinct varieties, one composed of *large* and the other of *small papules*.

Some of the *small papules* are about the size of a pin's head, while others are two or three times as large. They consist of distinctly limited, conical or rounded elevations of the skin, sometimes umbilicated, and in their early stages they have a deep pinkish-red color. When constituting the first eruption of the secondary period or an early relapse they are distributed over the whole body, sometimes closely packed together, and particularly copious on the forehead, about the nose and chin, on the back of the neck, on the outer surfaces of the extremities, and upon the scapular and gluteal regions. The papules may be arranged in groups

in the form of circles or segments of circles, or like the letter S or the figure 8. Sometimes the papules, composing rings which may have a diameter of half an inch or two inches, fuse and lose their individual shape. The circular form is assumed only in the regions referred to, while elsewhere papules may be seated without definite order.

In a generalized eruption papules may be seen on the backs of the hands and upon the scrotum and penis, where they usually become excoriated and are transformed into condylomata. Unlike the flat pupules, these are rarely accompanied by condylomata about the anus in the male and the vulva in the female. After frequent relapses the papules are generally less numerous and less confined to particular regions, while the ring-form becomes a more prominent feature. When the eruption occurs late in the secondary period it may be seen in but one region, and may even be unsymmetrical.

This eruption usually begins about the face and neck, and is fully developed at the end of two weeks. In some instances its evolution is so rapid that it has been called the "acute papular syphilide." In late relapses the papules appear as slowly as any other syphilitic eruption. Many of the papules are seen at the openings of follicles—a feature which is more noticeable in this than in any other form of syphilitic papule.

After their complete development the papules remain unchanged for a time. In some cases new papules, and exceptionally pustules, appear among the old ones. Soon their color changes to a sombre brown, and finally to a coppery hue. Small scales of epidermis, frequently in the form of rings, which correspond to the margins of papules, are detached by the infiltrative process beneath.

Frequently a few of the papules are converted into vesicles or pustules by the accumulation at their apices of a minute quantity of serum or pus. They may remain in this condition for a long time. Generally the fluid dries and forms a minute crust which may fall off spontaneously, leaving the papules apparently in their elementary state. In some cases pustules form, which may dry or become ulcers.

When uninfluenced by treatment the course of the eruption is chronic. In its early stage it yields slowly to treatment, but after long duration it becomes very chronic, and requires local as well as general treatment. Its rapid and early disappearance is desirable, since permanent atrophic spots like those of variola remain after a lesion which has had a long existence. These spots are pigmented, and they become white only after several months.

The **diagnosis** is generally easy, at least in the early stage. The eruption may be mistaken for the punctate form of psoriasis or for certain forms of lichen pilaris and lichen planus.

In *psoriasis* the papules tend to form patches an inch or more in diameter, and the scales are copious, silvery, and imbricated.

Lichen pilaris is an inflammatory affection, chiefly of hairy regions, and is accompanied by intense pruritus, and the papules often form patches of thickened skin.

In lichen planus the papules are flatter, less uniform, more commonly umbilicated, are always pruritic, and are more likely to lose their original character by confluence.

Moreover, with the syphilide we have the specific history and possibly the coexistence of other and distinctive lesions.

This form of papular syphilide may be mistaken for acne, especially on account of its appearance on the back. In acne the lesions are most abundant about the face and shoulders; they vary greatly in size, and are accompanied by more hyperæmia. Acne usually begins about puberty and has a history of many recurrences.

The Lenticular Papular Syphilide.

There are two varieties of flat papules caused by syphilis—the *small* and the *large*. The *small papules* frequently occur in the form of a general eruption; this is rarely true of the large papules, which are usually seen concurrently with a small papular eruption, an erythematous or perhaps a pustular syphilide. These two forms of papules present striking differences.

The Small Flat Papular Syphilide.

[illegible]

numerous over the anterior surface of the shoulders, but comparatively sparse on the outer surface of the arms, while they are more numerous on the inner or flexor surfaces, especially near the joints. Few are seen on the dorsum of the hands, while the palms are more freely supplied. They are exceptionally numerous on the gluteal regions, and are not infrequently found upon the penis, the mons Veneris, and in the inguinal

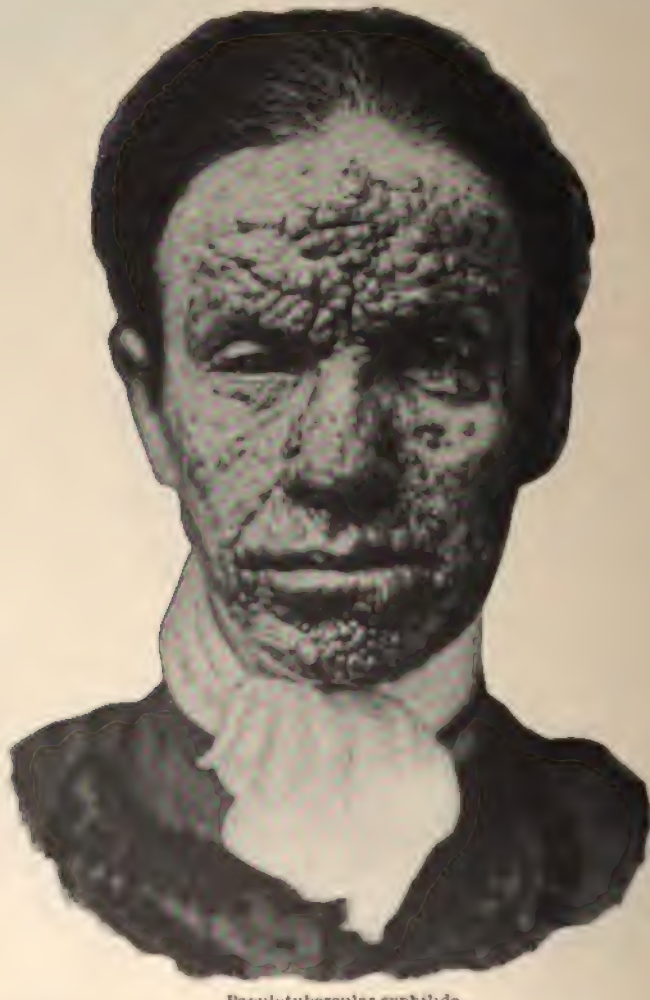
Fig. 133.

Small flat papular syphilide of the face.

regions. They are more plentiful on the inner than the outer aspects of the thighs, and they either do not extend below the knees or are sparsely distributed upon the inner surfaces of the legs and sometimes upon the soles. The face is spared by this syphilide more frequently than by the small miliary variety. It sometimes assumes the form of the so-called "corona Veneris," and occupies the forehead where the hat presses; it is seen upon the alæ nasi and about the mouth, and shows a marked ten-

dency to development near the junction of the skin with mucous membranes. In rare cases the papules are very copious and hypertrophic, and really constitute papulotubercles upon the face, where they cause a peculiar expression, similar to that sometimes seen in true leprosy, which

Fig. 134.



Papulotubercular syphilide.

is called by some authors "syphilitic leontiasis." (See Figs. 133 and 134.)

The color of the small flat papules varies in different regions of the body and in different persons. In its early stage it is a pinkish-red, which soon becomes brownish or coppery; this change occurs first on the face, especially the forehead, then on the legs. In persons with

delicate skin or feeble circulation the color is at first very light red, which changes to a light yellow tinged with brown.

In exceptional cases a peculiar necrotic change takes place upon the surface of many of the papules. Their epidermis is thrown off either by scaling or by molecular decay, and is replaced by a dirty-brownish membrane of a fibrous nature, which is removed in fragments or in mass and exposes a granular ulcerated surface. This seems to be a diphtheritic deposit.

The Large Flat Papular Syphilide.

The large flat syphilitic papules are either round or oval, and have a diameter of three-eighths to one-half of an inch, and exceptionally of fully one inch. They begin as minute spots, which, as a rule, rapidly increase in area. Their surface is flat, but occasionally there is a well-marked sloping depression at the centre. They are distinctly elevated, with rounded, sharply defined edges. A few small adherent scales lie upon the surface, and at the margins of the papules an epidermal fringe or rim may be seen. They generally have a decidedly red color, which soon becomes coppery. In rare cases they are bright crimson-red, and exceptionally they have a deep purplish-red tint. They run a chronic course, and cause neither pain nor itching. The surfaces of the papules in rare instances undergo superficial necrosis and become covered with a thin, dirty-looking diphtheroid membrane. Such an occurrence is always indicative of a depressed condition of the system and of a severe form of the disease.

This eruption occurs under a variety of circumstances. In some instances a few papules may be found with an erythematous syphilide or an eruption of small flat papules on the forehead, the neck, and about the genitals. In rare cases this syphilide is the first eruption, and it then resembles the small flat variety in its mode of appearance and its course. It occurs upon the palms and soles with about the same frequency as the latter, and in these regions it may develop the so-called palmar and plantar psoriasis. When occurring as a first generalized rash this syphilide shows no tendency to a circular arrangement, and, although the papules may be more closely aggregated on such parts as the face, neck, shoulders, inguinal and gluteal regions, and near joints, they do not coalesce except in parts continuously irritated. Owing to irritation their area sometimes becomes greatly increased.

This syphilide may also become complicated with seborrhœa.

Prognosis.—The early appearance of this syphilide indicates an active form of syphilis, and calls for prompt and careful treatment. A relapse of the eruption indicates continued activity of the disease. As

to the eruption itself, its disappearance is merely a question of time and of treatment.

Diagnosis.—A general eruption of this syphilide presents such distinctive features that errors in diagnosis are scarcely possible. Where it occurs in limited numbers and runs a chronic course, particularly when there are several eruptions of papules at short intervals, no other lesions being visible, it may be mistaken for psoriasis. The question may be still further complicated by the appearance of papules upon the elbows and knees. A distinction can, however, generally be made by attention to certain points. In syphilis the papules have a uniform size not seen in psoriasis; in psoriasis the spots are likely to blend and form gyrate patches; while in syphilis they gradually pass away after reaching maturity. The color of the psoriatic patches is pinkish or deep crimson; that of the syphilitic papules is deep brown or dull crimson. It must be confessed, however, that a diagnosis must, in some cases, be established by other features. The scales of the syphilitic papules are not as copious and usually not as silvery as those of psoriasis; they are simply more or less adherent flakes of epidermis. Moreover, in syphilis there is a history of some other symptom or lesion, or there may be other specific lesions on the body at the time. There may also be cachexia in syphilis, while patients with psoriasis are generally remarkably healthy. The age of the patient is sometimes a point of importance. As a rule, psoriasis begins in early life and only exceptionally after puberty. The syphilide is more common after puberty, on account of the more frequent occurrence of syphilis after that period. Finally, mercurial treatment has no effect upon psoriasis, while it is especially beneficial in this form of syphilide.

Scaling Papular Syphilide of the Palms and Soles (Syphilitic Psoriasis of the Palms and Soles).

Papular syphilides of the palms and soles are often peculiar and difficult of diagnosis. They may occur at any time in the secondary period or may coexist with tertiary lesions; they run a chronic course, unaccompanied by pain and itching, and are generally rebellious to internal treatment.

The erythematous syphilide is often developed on the palms in scattered spots which have a deep-red color, are slightly elevated, and covered by a layer of epidermis. In favorable cases, subjected to treatment, scaling soon occurs, leaving a smooth, rosy, slightly depressed surface, surrounded by an undermined rim of epidermis. The mode of development of these spots, when not treated, will be described later.

In a general eruption of flat papules a few sometimes occur in the hollow of the palms and soles. They are small, decidedly elevated, and

have a deep-red or purple color, which soon becomes obscured by the great increase of epithelial scales. This is well shown in Fig. 135. Exceptionally they are very numerous in the above regions. They disappear under treatment, but if left to themselves they become chronic.

FIG. 135.

Circumscribed scaling papular syphilide of the palm.

In some cases, usually early in the secondary period and coexisting with dermal or other manifestations, or perhaps being the only evidence of syphilis, a varying number of small, firm, hard, colorless elevations or miniature corns appear on the palms. Usually there are about a dozen on each hand; there may be only two or three or they may be much more plentiful. They cause neither itching nor pain, but are in some instances tender under pressure. They run an indolent course and disappear chiefly by scaling. They are composed of dense masses of epidermal scales which can be dug out with a knife.

The well-marked scaling syphilides of these parts may appear as early as the third month of syphilis, at the time of a relapsing eruption, or even at a much later period.

These patches constitute the true scaling syphilide of these parts, and are called by most authors "syphilitic psoriasis of the palms and soles" (Fig. 136).

The **diagnosis** of the early papular syphilides of the palms and soles is generally easy, since neither eczema nor psoriasis produces similar

appearances. In their early stage the color and situation of the patches indicate their nature, while the history of the case and the coexistence of other syphilitic lesions furnish additional evidence. When the patches are diffuse their resemblance to psoriasis is almost perfect. The

Fig. 136.

The diffuse scaling syphilide of the palm.

latter, however, is often more scaly, is usually more scattered, and is scaly from the first, or begins as rosy-red patches and scaling spots. In many cases of the syphilitic eruption, particularly when it is quite chronic, only one hand will be found to be attacked, and that one will be that most commonly used and subjected to friction. When this eruption is developed rather late in the course of syphilis it may attack only one hand. This unilaterality of the lesion is strongly suggestive of syphilis.

Treatment.—These eruptions are usually amenable to internal medication if they are attacked early. But even if internal treatment is directed, one or other of the external methods should be used occasionally, in order to expedite their involution. The small and large miliary papular syphilides are the ones which are most resistant to general and local remedies. They, like all stubborn papular syphilides, should be treated by hot baths, either alkaline or sulphur, and by frictions of mercurial ointment. Mercurial ointment is to be rubbed into the surfaces vigorously, each séance occupying from twenty minutes to half an hour. Scaling eruptions of the palms and soles, the sequelæ of the erythematous and papular syphilides, are peculiarly obstinate and prone to relapse. They may be benefited by local sublimate baths taken once or twice a day. Hot alkaline baths with the

addition of bran are also very efficient. After immersion of the parts they should be enveloped in a mild form of mercurial ointment, such as equal parts of mercurial ointment and cold cream or of citrine ointment similarly reduced.

In some cases of localized eruption a mild solution (from 1 to 4 grains to the ounce), of bichloride of mercury in flexible collodion or traumaticin may prove very efficient. Sometimes, when the tendency to scaling is very persistent, chrysarobin may produce happy results.

THE PUSTULAR SYPHILIDES.

These syphilides constitute an important group of eruptions, which, though less common than the erythematous and papular forms, may appear at the earliest stage of syphilis, at any time in its secondary period, or even late in its tertiary period. They vary in severity from a mild and ephemeral eruption to one of the gravest character. The size of the pustules varies from that of a pin's head to that of a ten-cent-piece; they may be acuminate, globular, or flat; they are generally round, but sometimes oval; and they are surrounded by a dull, coppery-red areola. Some have a well-marked papular base, the pustule being a minor part of the lesion; beneath all of them there is more or less infiltration. They may begin as papules or as distinct pustules. They vary greatly in number, sometimes covering the entire body or, on the contrary, being limited to special regions. They show a marked tendency to appear on localities rich in hair- and sebaceous follicles, while some are prone to be developed in particular regions. The pustules may be either scattered or in groups, and are almost always symmetrically placed. Relapses of this syphilide are common; the earlier the eruption the more rapid is its invasion and the more numerous are its lesions, while later eruptions appear slowly, in limited numbers, and with a marked tendency to localization.

The earlier eruptions, being papulopustular, usually cause no destruction of the skin; while the late ones, being extensive, deep, and localized, leave cicatrices, which remain pigmented for a long time, but finally become shining white.

The Acneform Syphilide.

This syphilide is thus called because, like *acne vulgaris*, it attacks the hair- and sebaceous follicles, and because it is a papulopustular lesion. It consists of conical or slightly rounded pustules, varying in diameter and elevation from one-third of a line to a line. Sometimes the pustules are as small as a pinhead. They may form the whole eruption, or they may be mingled with miliary papules or the erythematous syphilide.

When appearing at the beginning of the secondary stage as a general eruption the pustules are usually accompanied by fever, which sometimes reaches the highest point observed in syphilis, and by other symptoms peculiar to that stage. The mode of invasion may be rapid or subacute. In the former case the small red spots rapidly become papular and then pustular, the lesion reaching its full development within twenty-four or forty-eight hours.

This eruption generally begins about the face, scalp, back of the neck, and shoulders, and may thence invade the trunk and extremities, being more copious on the scapular, sternal, and gluteal regions and on the outer aspect of the limbs. We in some cases find syphilitic papules or erythematous patches on the inner surface of the arms and legs and on the anterior aspect of the trunk. When the pustules are scattered over the entire body they may be closely crowded or separated by marked intervals. The first eruptions are always more copious than relapses, in which the pustules appear possibly grouped in patches or in a ringed form about the face, scalp, or shoulders, usually having been preceded by an erythematous or papular syphilide.

The **prognosis** of this syphilide is not so good as that of other earlier forms. The eruption itself is troublesome, and the general health is more frequently impaired after this rash than after others.

Diagnosis.—The history of the case, the presence of other lesions, and the appearance of a generally distributed pustular syphilide preclude the possibility of mistake. Acne vulgaris resembles it in certain particulars. Acne, however, generally begins about puberty, and is confined to the face and back, and rarely attacks the hair of the scalp. It is never attended by systemic reaction. Moreover, it presents papules, pustules, and comedones, which have no uniformity of size; some are, indeed, miniature furuncles, and all have at some time a more or less hyperæmic areola.

The **diagnosis** of this syphilide is generally easy. Prodromal symptoms observed in small-pox and varicella, such as backache and eruptive fever, are noticeably absent, and there is much less general disturbance. In the acute eruptions there are great heat and tension of the skin, and at the outset small shot-like papules may be felt, which rapidly pustulate. More or less diffuse patches of hyperæmia, accompanied by sensations of itching and burning of the skin, are sometimes present. Variola progresses so rapidly that its nature is perfectly clear after the second day. The slow development of the syphilitic eruption and the absence of subjective symptoms are distinctive points in the diagnosis.

The Impetigoform Syphilide.

This syphilide, like the preceding, is a pustulocrustaceous eruption, and attacks the more superficial layers of the skin, differing, however, in the fact that the lesions are not so distinctly circumscribed, but have a tendency to involve a much greater surface and often to assume a serpiginous character.

The resemblance of this eruption to simple impetigo is in the grouping of the pustules, in their fusion, and chiefly in the somewhat similar appearance of the crusts. The pustules of the specific eruption are usually much larger and flatter than those of the simple form, and their resemblance is hardly so close as to warrant the term "impetigoform" applied to them. They dry so quickly into crusts that the pustular stage soon ceases.

In some untreated and broken-down cases these pustulocrustaceous lesions take a serpiginous course, invading the superficial layers of the derma, generally of the upper extremities.

The **course** of this eruption is usually very chronic. On its invasion the pustules may be very numerous, or a few only may first appear on the head. Thus for long periods new pustules may appear as old ones fade. In other cases a general, extensive rash may run its course in a comparatively short time.

The **prognosis** must be based upon the patient's general condition as well as upon the eruption itself. The presence of the eruption, however slight, is an indication for careful and continued treatment and for attention to the patient's nutrition and hygiene.

Diagnosis.—This syphilide may be mistaken for impetigo in its disseminated and in its confluent form. The lesions of impetigo retain their pustular character much longer than do those of syphilis. They are attended by heat and itching of the skin, and have an inflammatory areola; they are much more uniform in size than are the pustules of syphilis, and their crusts are of a greenish-yellow color instead of the greenish-black of syphilis. The acuteness of invasion in the case of large patches of the simple eruption is in striking contrast with the slow, painless, and indolent character of the syphilide. These features, considered in connection with the history of the case, make the diagnosis clear.

The Variolaform Syphilide.

This eruption is much less common than the acneform variety, and is interesting chiefly in its resemblance to varicella and variola. It is rarely the first eruption of syphilis, but appears after any of the early rashes.

It consists of round superficial pustules, the epidermis covering the

pus being rather thin. It begins in the form of red spots, which within a day or two become pustules with a diameter and an elevation of one or two lines. These pustules are surrounded by a limited, deep-red areola, and there is evidently not very much thickening at their bases. When fully developed they flatten slightly at the centre, some presenting marked umbilication. (See Plate XXXV.)

These pustules have no tendency to a follicular origin, but are found on parts where the skin is soft and delicate, frequently, like other syphilides, upon the forehead and at the line of junction of skin with mucous membrane. They are generally sparse on the outer aspect of the extremities, more numerous on the anterior of the trunk, and often abundant near the genitals and in the inguinal region.

The mode of invasion of this eruption is generally rather slow, and is seldom accompanied by pronounced febrile movement. It begins about the face, and thence spreads slowly over the body in the course of one or two weeks. The crusts, which form when the pustules reach their height, fall off, leaving pigmented spots. Sometimes new crops rapidly succeed old ones, so that an eruption may last several months. The eruption is greatly influenced by treatment; although its full arrest is difficult, future outbursts may be prevented.

The **prognosis** is the same as that of other pustular eruptions.

The Ecthymaform Syphilide.

There are two varieties of this syphilide, superficial and deep. The superficial is the earlier eruption, appearing at any time during the first year of syphilis, and is usually composed of a greater number of pustules. The latter resembles those of non-specific ecthyma in having a solid, elevated base surrounded by a crust, and in their tendency to ulcerate. The deep form may be an intermediary lesion, or even a rather late one. The pustules of the superficial form vary in diameter from one to three lines. They begin as slight red elevations of the skin, which in a day or two become small conical pustules. The pustules gradually increase in size, and crusts are formed by desiccation of the pus. The crusts grow in proportion to the bases of the pustules, and their yellow color soon becomes brown, which is rendered still darker by particles of dirt and sometimes by admixture of a little blood. When fully formed their color is yellowish-brown and their shape round or conical. As the pustules increase in size the crusts become flattened and even depressed at the centre. The base is at first of a bright-red color, which soon becomes a dull reddish-brown, and it is surrounded by an abruptly limited areola. Beneath the crust, which is seldom firmly adherent, is an ulceration, involving the superficial layers of the derma, and having

PLATE XXXV.

THE VARIOLAFORM SYPHILIDE.

[redacted]

PLATE XXXVI.

THE SUPERFICIAL ECTHYMA-FORM SYPHILIDE.

a smooth floor covered by a grayish-red film of molecular detritus bathed in thick pus.

The superficial ecthymaform syphilide begins by the development of pustules either in a disseminated or an aggravated form, about the scalp, particularly at its junction with the face and neck. They may appear gradually and without much febrile movement, or in a manner quite the reverse. Soon after other portions of the body, such as the anterior surfaces of the legs and forearms, the trunk, particularly on the posterior surface, and the inguinal and gluteal regions, may be invaded. (See Plate XXXVI.)

The deep variety of the ecthymaform syphilide is usually a rather late lesion, but it is sometimes precocious. In the latter case it may be very malignant, and it is then the expression of profound syphilitic cachexia. This syphilide begins as a papulotubercle. A round or oval elevation

Fig. 137.

The deep ecthymaform syphilide.

appears, upon which a quantity of yellow pus soon forms, and this becomes thicker and dries into a crust of a brownish-black color, owing to the effusion of a little blood. When fully formed we find an incrusted papulotubercle, with a diameter of one-quarter to one-half of an inch. The firm, deeply seated base has a dark, coppery-red color and is surrounded by an areola of a similar hue. The crust is generally rounded or conical, but may flatten out as it extends. (See Fig. 137.) A deep, punched-out ulcer, with sharply cut edges and a smooth, gray-

ish-red surface, covered with a foul, rust-colored pus, underlies the crust, which can be removed with little force.

This eruption is generally most abundant on the antero-exterior surfaces of the legs; often these pustules may form on the corresponding surfaces of the arms or about the face and on the lower portions of the trunk. It is usually developed slowly, appearing in crops of from two to twelve at intervals of one or several weeks.

The **prognosis** of this syphilide is variable. In the superficial form the eruption often gives much annoyance, yet it may disappear without leaving scars. The condition of the system is always below par, and the prognosis should be governed in great measure by the degree of improvement under treatment. In most cases a favorable result may be expected in the course of a few months, but in rare cases prolonged cachexia follows.

The prognosis of mild and limited cases of the deep variety is usually good. In more extensive and relapsing cases the outlook is less favorable; the presence of the eruption indicates a depraved condition of health, which is greatly aggravated by the irritation and drain of the deep ulcerations. A few months of proper treatment will, however, generally effect a cure.

The **diagnosis** of this syphilide is almost always easy, although it may be mistaken for ecthyma. The superficial form is to be distinguished from a similar ecthyma by the peculiar course, situation, and appearance of the syphilitic pustules as compared with the more inflammatory, pruritic pustules of ecthyma, which are more uniform in size, have yellowish-brown crusts, and much less tendency to ulceration. Moreover, ecthyma usually occurs on the legs of broken-down subjects, and is an eruption of papules and pustules, the latter forming only superficial ulcers. In some cases of phtheiriasis in uncleanly and unhealthy persons pustulocrustaceous ulcers, somewhat resembling those of syphilis, are seen, but with care a diagnosis can always be made. The discovery of the Pediculus vestimentorum, the presence of minute blood-crusts caused by the bite of the insect, and very often scratch-marks, and a general papular and pruritic condition establish the diagnosis of phtheiriasis.

Treatment.—The early and intermediate pustular syphilides require sublimate, mercurial vapor, and sulphur and alkaline baths. Then the patient's body should be rubbed with mercurial ointment or a strong white precipitate ointment. About the face it is imperative that these lesions should be efficiently acted upon, in order to cause their prompt disappearance and to prevent cicatrices.

Zinc ointment to which is added white precipitate in the proportion of 5 or 10 per cent. is a very useful preparation. Resorcin may also

be used in similar combination and strength. The encrusted syphilides require the use of baths and fomentations for the removal of crusts, and then calomel or iodoform may be dusted upon the raw surfaces, which should be covered with absorbent gauze. When these surfaces are extensive iodoform should be used sparingly, lest it produce a toxic effect, or it may be mixed with an equal quantity of subnitrate of bismuth and then applied more freely. Similar combinations of aristol or resorcin may be used with benefit. Upon the raw surfaces left after the removal of crusts a solution of bichloride of mercury (1 : 2000) may be used once or twice a day. In these cases mercurial fumigations are often wonderfully curative.

MALIGNANT PRECOCIOUS SYPHILIDES.

These syphilides are of a malignant and ulcerative character, and are usually found in weakly and cachectic patients. They occur in three quite distinct varieties.

The first form is a pustular rash attended with extensive ulceration and formation of scabs. It begins as rounded pustules, grouped or irregularly scattered, which soon ulcerate and form flat or conical greenish-black crusts which may blend together. The ulcers are deep, with sharply cut, undermined edges and a foul base secreting a fetid pus. Such an eruption appears first upon the face or scalp, where the lesions are often in groups; then it invades the arms, and may even extend over the entire body, successive crops of pustules being developed in severe cases. There is rarely a tendency to ringed distribution, but sometimes one group of pustules is increased by the formation at its periphery of new pustules.

The second form begins as a red tubercle of the size of a pea, which is rapidly converted into an ulcer with a thick crust. The subsequent course is similar to that of the previous variety, except that the destruction of tissue is often much greater. This eruption is prone to appear first on the head and upper extremities. In some cases these regions only are attacked; in others the whole body is invaded. The invasion of this eruption, like that of the preceding one, may be rapid or slow. Its course is chronic, sometimes occupying six or eight months or even a year.

The third form is one of the most formidable manifestations of syphilis, and is happily rare. It is always accompanied by cachexia, and if not fatal always leaves a condition of permanent ill-health. It begins as round tubercles of a dark-red color, slightly elevated and deeply seated in the skin, which attain a diameter of an inch or more. A small blackish slough forms in the centre of each tubercle, and is at first firmly adherent; it extends rapidly, and, soon becoming loosened

by the secretions, is cast off as a fetid, cup-shaped mass, looking something like an inverted rupia crust. The ulcer thus exposed is very deep, has a foul, dark-brown surface with hard, everted edges, and secretes a fetid ichor. To the touch it gives the impression of being deeply seated and indurated like a typical initial lesion or chancre. Surrounding each tubercle is a broad, deep-red areola. Phagedena may occur and run a course similar to that of phagedenic gummous ulcers. From time to time brownish-green crusts form and are thrown off. In favorable cases the surface of the ulcer gradually assumes a more healthy appearance, the edges become softer, and healing takes place.

The invasion of this syphilide is generally rapid, but its subsequent course is slow. Usually tubercles are developed in region after region, followed perhaps by additional crops. They are irregularly scattered, with no tendency to a ringed form. The face, the extremities, the shoulders, and buttocks are its favorite seats.

The **prognosis** of these syphilides is always grave, since they indicate a most intense and active form of syphilis. The health of the patient previous to infection, his habits, the extent and character of the eruption, and the degree of cachexia must all be considered. The course of the lesions and the influence of treatment must be watched.

As regards **treatment,** every effort should be made to improve nutrition. Much can be done toward checking the course of the eruption by the employment of local measures. Careful dressing of the ulcers, their thorough disinfection, and the early removal of secretions not only add to the comfort of the patient, but promote healing. The local measures detailed for the treatment of pustular and encrusted syphilides may be used for these eruptions. (See page 558.) In spite of every precaution indelible cicatrices are generally left. Internal treatment must also be employed. The guarded use of mercury, preferably by inunction or by hypodermic injection, with iodide of potassium, sodium, or ammonium internally, is indicated. Opium is often particularly useful in these cases by calming the restlessness of the patient and quieting the pain of the ulcers.

We may sometimes resort to mercurial vapor baths with iodide of potassium or sodium, combined with bitter tonics, internally, beginning with ten- to fifteen-grain doses three or four times a day, and gradually increased by two or three grains daily. Mercury given in this way is supposed to have a beneficial local as well as general effect. The condition of the stomach demands that the most digestible and nutritious food be taken, if possible in small quantity and at frequent intervals. Stimulants, preferably port wine or brandy, must be given regularly. Such treatment as the above is suitable when the patient is

still able to move about. In a typhoid condition treatment applicable to the adynamic fevers is called for, together with the careful use of the iodides.

PRECOCIOUS GUMMATA.

There are three distinct varieties of early or precocious gummata—a generalized, a localized, and a neurotic variety.

The generalized form appears as early as the eighth week of infection, and at any time during the first and early parts of the second year, the rule being that the earlier the date of appearance the more extensive is the eruption and the more numerous the lesions. It begins in the form of small circumscribed swellings under the skin, usually unattended with pain and only perceptible to the touch. In a short time these become adherent to the skin, and then they appear like bright-red spots, which are frequently looked upon as blind boils. Thus early they are found to be round or oval tumors of the size of a bean deeply set in the skin. They grow quite rapidly, and within ten days may attain an area of an inch or inch and a half. A slower growth is also seen. As they increase in size their red color becomes more sombre, and perhaps coppery. When fully developed they present a quite firm structure, and may be said to be in the stage of condensation. Their course is usually without much variation. As they grow older their red color becomes more coppery, and they gradually grow softer in structure, as if they were permeated with fluid. This may be called the stage of softening, which varies in degree in different cases. In some tumors there is simply a soft, yielding condition of the tissues; in others, what appears to be true fluctuation may be felt. To the inexperienced these tumors in the latter case may give the impression of abscesses and suggest the use of the knife, which, however, should not be used, since absorption may occur even in this stage of liquefaction of the gummy infiltration. Under favorable circumstances these lesions do not go on to ulceration, and they are then said to belong to the resolutive variety of this early form of gummata. Then the tumors gradually lose the slight convex elevation which they had attained, and slowly flatten out, while they gradually melt away from their outer edge, their color fading *pari passu* until a pigment-spot is left which is most persistent upon the legs. Slight or deep cicatrices may also be left.

In some cases the resolutive tendency in this eruption is not observed, but a necrobiotic action soon appears. The stage of condensation is then quite short and softening begins early. The centre of the tumors assumes a dark-red color in one or in several spots, and distinct fluctuation is soon made out. Then slight ulceration begins, usually

in several places, corresponding to the follicular openings, and very soon the epidermal roof of the tumor melts away, and an unhealthy ulcer with a slightly fungating greenish-red floor, covered with a sanious pus and surrounded by a thickened, deep-red, undermined, and more or less everted edge, is seen. As a rule, however, these precocious gummatous ulcers are more superficial than the tertiary ones; their floor is less deep, their edges less undermined and everted, and their whole appearance indicates that the destruction is less extensive.

The *localized form* of early gummata appears somewhat later than the preceding one; that is, at about the fifth month and within the first year of infection, and perhaps later. The difference between the two is mainly that of degree and extent of development of the lesions. Like the first variety, the evolution of the tumors is aphlegmasic, but a little more indolent and insidious; in short, partaking to a certain extent of the characteristics of both the very early secondary and tertiary gummata. The tumors present the same appearance, except that they are large and perhaps not quite as salient as those of the first variety.

The *neurotic form* of the early gummata has a marked individuality of its own, and presents points of resemblance to erythema nodosum. In the very early months of syphilis, either in the stationary period of an early syphilide or at its decline, generally preceded or accompanied by severe neuralgic symptoms involving the facial or cranial, intercostal, anterior crural, or any cutaneous nerve, by cephalalgia continuous or nocturnal, by rheumatoid pains in the muscles or joints, and by malaise and debility, this eruption makes its appearance early and develops quite rapidly. In some instances so acute is the invasion that in a week we may find fully developed tumors an inch or two long, but in general their evolution is less rapid. In addition to the neuralgic phenomena, local pains on the sites of the lesions or on the whole territory or limb on which they are developed are complained of. These pains may be continuous or intermittent, and in some instances are as excruciating as in severe herpes zoster. They are described as flashing, burning, lancinating, and are sometimes said to resemble those of an abscess. In some instances the patient's sufferings are less after the evolution of the syphilide, but in most cases the tumors are so painful that patients shrink in terror from their palpation. There is also a moderate febrile movement, an evening temperature of 100° or 101° F., and in very severe cases as high as 104° F.; emaciation, want of appetite, and concomitant symptoms. The seats of predilection are the forearms and legs, but the tumors may appear on the shoulders, arms, thighs, chest, and trunk.

The eruption consists of two orders of lesions: first, oval or round

tumors, or irregular plaques from fusion of tumors; second, tumors or nodosities seated in the subcutaneous tissues, at first freely movable under the skin and fasciæ, and later on adherent by both their upper and lower surfaces.

The cutaneous tumors begin by infiltration in the deeper portions of the skin and its contiguous connective tissue. When first seen they are in bright-red and rather sharply circumscribed spots, which soon form round or oval swellings, slightly raised and convex. In some cases the bright-red color rapidly becomes darkened until a blackish-red or decidedly ecchymotic appearance is seen, while in others it is of a deep red similar to that of erythema nodosum. In some cases, again, the red centre pales and becomes the color of white wax or of a billiard ball, while the deep-red border or areola remains in various stages of intensity, consisting of a commingling or play of colors, such as we see following a bruise or erythema nodosum. In many cases resolution takes place; in others the stage of softening may end in ulceration. The resulting ulcers present all the characters of the late gummata, except that they are rather more superficial. Their subsequent course is usually chronic and aphlegmasic.

The **diagnosis** of these lesions is usually very easy. The history of the case and the subacute character of the swellings are so distinctly different from erythema nodosum that a mistake can hardly occur.

Treatment.—The early or precocious gummata indicate the necessity for the use of the mixed treatment, or of iodide of potassium in combination with mercury applied locally. Daily inunctions should be made, and lint spread with mercurial ointment should be bound upon the parts. If much pain is present, belladonna ointment may be mixed with the mercurial ointment.

THE PIGMENTARY SYPHILIDE.

The pigmentary syphilide is seen in three well-marked and quite distinct conditions:

1. In the form of spots or patches of various sizes.

2. As a diffuse pigmentation of greater or less intensity, which sooner or later becomes the seat of leucodermatous changes in the shape of small spots which gradually increase in size. This is the retiform pigmentary syphilide.

3. In an abnormal distribution of the pigment of the skin, in which, owing to the lack of or crowding out of the pigment in places, they become whiter, while the parts involved in the abnormal distribution become darker; in this way a dappled appearance is presented. In this form there is probably no excess of pigment; it is seemingly unequally distributed throughout the tissue-expanse. This form has been termed

the marmoraceous, from its resemblance to some forms of marble in which there is an intimate interblending of light and darker colors.

All forms of the pigmentary syphilide appear both early and late in the secondary period, and they may be the only evidence of the diathesis or they may coexist with other manifestations. The evolution of this syphilide may occur as early as the second or third month, but it usually appears about the sixth month or toward the close of the first year, or it may develop during the second or third year of infection. It occurs most commonly in females, particularly blondes, up to the age of thirty or thirty-five years. It is rarely found in the male sex.

The parts of predilection of the syphilide are the lateral surfaces of the neck, less frequently the face, and then more commonly the forehead. It may be seen on the trunk, arms, and legs, and may, very exceptionally, slowly invade the whole body. It is unattended by any subjective symptoms whatever. The pigmentary syphilide is peculiar in the fact that it is wholly uninfluenced by internal treatment, and external applications have little if any effect upon it.

The pigmentary syphilide in the form of spots or patches consists of round, oval, or irregular plaques, which may have sharply defined borders or their margins may be dentated or jagged. Their color varies from a light-brown *café-au-lait* to a quite deep-brown tint. They are unaffected by pressure and the condition of the circulation. In persons with light and delicate skin they may be very faint in tint and perhaps only perceptible in oblique light.

In this form of pigmentary syphilide it is common to see the uneven distribution of the pigmentation; sometimes the color is deeper at the margin. Commonly there is no involvement of the intervening skin, though sometimes the hyperchromatous condition produces the illusion that the unaffected skin is whiter than normal. These pigmented spots may remain unchanged and indolent for months, particularly in cold weather. In the course of time they slowly disappear.

The second form of pigmentary syphilide—the lace or retiform variety—is far more common than the other forms. Slowly or rapidly the sides of the neck become discolored the tint being that of *cafe-au-lait*, or even of decided yellowish-brown. The most common site of this eruption is on the sides of the neck, and perhaps on the back of the neck. (See Plate XXXVII.) The patients usually say that they noticed or were told that their necks were getting or had got dirty. Intelligent and observant patients will very often state that their trouble began with a browning of the skin, and they will state positively that there was no intermingling of white spots. From the neck this eruption may extend extensively over the trunk, mostly anteriorly or down the arms. When the pigmented patch has in

PLATE XXXVII.

PIGMENTARY SYPHILIDE (RETIFORM).

volved more or less of the sides of the neck, a peculiar change will be observed in it—namely, the development of whitish spots which may be taken for leucoderma. Scattered irregularly over the pigmented surface close observation will show a few or many minute white specks, which in a short time, particularly in hot weather, become large enough to present definite shapes, which may be round, oval, linear, or irregular. These white spots gradually grow, and in many instances the neck is largely covered with them before the patient is aware of any change having taken place. They then say or are told that their necks are growing white. Toward the final stage of the disease the preponderance of the white spots leaves only round, oval, or wavy lines or strands of brown pigment, which give the appearance of lace with large meshes, the interstices being formed by the white spots, which are round, oval, gyrate, linear, or irregular. In this way the skin in the course of months, and in some cases of a year or more, seemingly returns to its normal condition.

The third or marmoraceous form of pigmentary syphilide is by far the least common. Its mode of invasion is slow and aphlegmasic, and there is little or no hyperpigmentation. The natural color of the skin, in spots of irregular size and shape, becomes white, while the margins, which are hazy and indefinite, become browner than normal. It seems to be a displacement of pigment resembling strikingly some delicate varieties of marble in which there are imperceptibly blended shades of white and very light black. In my experience, this form is always seen on the sides of the neck, and it does not show a tendency to extend. It can only be found upon persons of delicate skin, and very often only by close observation. It slowly disappears and the skin is left in its normal color.

Diagnosis.—In the stage of superpigmentation the case may be mistaken for chloasma if the history is not clearly brought out. When the white spots have become plainly visible, a diagnosis of leucoderma may be made. But usually the situation of the eruption, chiefly on the sides of the neck, will point to its specific nature. Then, again, in leucoderma the white patches have a distinctly brown though narrow margin, which is never seen in the pigmentary syphilide. The diagnosis of the syphilide from tinea versicolor is readily made. This eruption rarely exists on the sides of the neck alone, and if present there is continuous with large patches on the trunk. It is usually darker in color, slightly elevated, and scaly, and may be attended with mild pruritus. If a few scales are removed and microscopically examined, the microsporon furfur will be readily seen among the epithelial cells. The pigmentary syphilide is not a scaling affection, and if scales are scraped from the surface no micro-organism will be found.

Treatment consists in daily frictions with mercurial ointment or douches with a bichloride solution (1 : 1000).

CHAPTER XXXII.

SYPHILITIC AFFECTIONS OF THE VARIOUS MUCOUS MEMBRANES.

ERYTHEMA, AND MUCOUS PATCHES OF THE MOUTH AND TONGUE.

THE mucous membranes continuous with, and rather remote from, the mucocutaneous junctions are frequently affected in the secondary stage by hyperæmic and hyperplastic processes.

Erythema of the mucous membranes is usually identical, in the time of its appearance and in its general character, with the same eruption upon the skin. Like the latter, it ordinarily appears six or eight weeks after infection, and may affect any of the outlets of mucous canals, although it is most frequently seen upon the fauces, pituitary membrane, and genital organs, and in many instances doubtless fails to attract attention. It is most frequently seen upon the fauces in persons exposed to sudden changes of temperature, in smokers, and in those who are subject to frequent attacks of catarrh; upon the vulva in women who have frequent sexual intercourse; and upon the glans penis in men with a long prepuce. It may be the only general lesion present, or more frequently it is accompanied by other early manifestations.

This eruption often disappears quite suddenly, and is very prone to return.

Erythema and Mucous Patches of the Mouth.

Erythema of the buccal cavity is usually confined to the neighborhood of the fauces, and in the neighborhood of the outlet of mucous canals, especially around the genital organs and anus, upon the mucous membrane of the mouth, and sometimes upon other parts of the body, more particularly at the base of the nails and wherever the reflection of the integument upon itself forms natural folds in the skin.

It may readily be confounded with the effects of an ordinary cold, from which it often can be distinguished only by the history of the case. The presence of narrow, dusky-red bands of inflammation along the border of the velum, ending abruptly at the base of the uvula, is considered by some observers to be characteristic of syphilitic erythema. Associated with this condition, as well as with other lesions, there is often a general œdema, especially of the velum and uvula. The latter organ may become very much swollen.

The most common syphilitic lesions of the mouth are mucous patches. They are most frequently found upon the tonsils, the uvula, the velum palati and its pillars, the sides of the tongue, and the mucous surfaces of the lips, especially the lower. At the angles of the mouth they are often continuous with a pustular eruption upon the integument. The inner surface of the cheek near the last molar tooth is another favorite seat. The dorsum of the tongue and the gums are less frequently affected. Their most characteristic feature is a grayish-white color, appearing as if they had been pencilled over with a crayon of nitrate of silver, which has given them the name of "opaline patches." They are more irregular in their outline than condylomata, and, unlike the latter, are not, as a general rule, perceptibly elevated above the surface.

The name "smokers' patches" has been given to certain morbid areas most frequently seen on the mucous lining of the cheeks near the angles of the mouth. They occur most frequently in the mouths of inveterate smokers, and are due to proliferation of the epithelium, which becomes opaline, as though the spots had been touched with carbolic acid or with nitrate of silver; the patches are sometimes fissured, and may become eroded, although the epithelium is usually very adherent. They are generally quite obstinate, and persist long after the apparent extinction of the infection.

Treatment.—Mucous patches of the mouth, from which infection so often occurs to innocent persons, should be carefully and regularly treated. The morbid parts may be touched with a tampon moistened with a solution of nitrate of silver (30 gr. to water 1 ounce), or this may be used as a spray. The mouth should be constantly rinsed and the throat gargled with strong solutions of borax, chlorate of potassium, and alum. Particular attention should be paid to the condition of the stomach, and plain, nutritious food should be allowed. Smoking is to be absolutely interdicted, and the use of stimulants and irritating condiments is to be suspended.

In some cases the application of a 1 or 2 per cent. watery solution of chromic acid is very efficacious.

Superficial Affections of the Tongue.

Coincidently with pharyngeal erythema the mucous membrane of the tongue may also become hyperæmic. In some cases the morbid process extends over the whole tongue, while in others it occurs in the form of round or oval disks scattered over the dorsum. From these hyperæmic patches the epithelium may be removed, and as a result the surface is eroded or perfectly smooth, in the form of plaques, of which there may be one or several. This condition, somewhat frequently seen in syphilis, is also observed in the mouths of non-syphilitics,

particularly in those who suffer from gastro-intestinal troubles. Excoriated or smooth round or oval patches of the tongue are not, therefore, pathognomonic of syphilis.

Not uncommonly we see scattered over the tongue and at its tip and sides irregular patches of epithelial hyperplasia which have a bright or a dull pearly-white surface. These lesions, due to circumscribed areas of hyperæmia, are as small as a pin's head and perhaps of the extent of one or two lines. They are usually a little salient. By means of local and general treatment these lesions may be removed, but they are often very obstinate and persistent.

Mucous patches of the tongue are not infrequent, and are found chiefly at its tip or on its sides. They are more or less annoying or painful, and in smokers and persons suffering from indigestion they show a tendency to become chronic and to relapse in an exasperating manner. They may be complicated by general lingual hyperæmia.

As a result of erythema and mucous patches of the tongue, this organ becomes the seat of fissures which are developed either over the dorsum or on the sides. On the dorsum of the tongue these fissures are irregular and sinuous in shape, while on the sides and at the tip they are in general vertically placed. Coexistent with this fissuration of the tongue there is usually mild or severe epithelial hyperplasia.

These lesions are obstinate in their course, and they present decided evidence of being of epithelial structure. They have been variously called psoriasis, ichthyosis of the tongue, and leukoplakia. When they begin in the secondary period it is usually not difficult to establish the fact that they originated in a syphilitic soil. But when they develop late in the infection there may be some doubt as to their etiology. These lesions belong to the class of parasyphilitic manifestations, which are usually processes or conditions resulting from irritative changes left by the original syphilitic inflammation. They are the outcome, but not the essential derivatives, of syphilitic infection.

These lingual lesions are very prone to lead to epitheliomatous degeneration, hence their bearers are always in jeopardy.

Treatment.—The treatment of mucous patches and of the milder forms of epithelial hyperplasia of the tongue is similar to that of mucous patches of the mouth.

In the obstinate cases of fissures a gargle of bichloride of mercury in water, 1 : 1000, is sometimes very beneficial. In some cases these lesions require active but carefully applied cauterization, either with equal parts of carbolic acid and glycerin or nitrate of silver and water, even as high as 10 per cent. Strong applications should only be made at intervals of several days. In the interim mild and astringent solutions of alum or tannin may be used.

For epithelial plaques it may be necessary to apply liquid carbolic acid or a solution of caustic potassa (ʒj to ℥j water). These cases sorely tax the patience of the afflicted person and of the surgeon.

In all cases of syphilitic inflammation of the tongue it is most important that every source of irritation shall be removed.

Internal treatment has no influence whatever upon the psoriatic or ichthyotic patches of the tongue.

AFFECTIONS OF THE NOSE.

The pituitary membrane may be the seat of erythema, superficial ulcerations, and mucous patches, which give rise to symptoms resembling those of an ordinary catarrh. Besides these lesions, in some cases an adenoid tissue is developed, which gives much trouble and annoyance by stopping up the nasal passages. Sometimes an ulcer may be seen just within the nasal orifice, surrounded by swollen mucous membrane and rendering the alæ nasi tender upon pressure. Plugs of inspissated mucus, mixed with blood and pus, which obstruct the passages, are from time to time discharged. The nasal secretion is more abundant and more purulent when ulcerations or mucous patches exist. In the absence of other lesions of syphilis upon the skin or elsewhere the character of the nasal affections may be suspected only because of their persistence.

Treatment.—In treating erythematous exulcerous conditions, mucous patches, and adenoid inflammation in the nose it is of prime importance not to use strong stimulating applications, except under certain restrictions. The parts should be sprayed several times a day with Dobell's solution. The very mild solution of nitrate of silver (gr. j to ℥viij water) may be used, and very frequently insufflations of equal parts of iodoform and boric acid are very beneficial. In all cases, as a rule, an active internal treatment should be ordered.

AFFECTIONS OF THE LARYNX.

In the secondary stage the larynx may be attacked by (1) erythema, (2) superficial ulcerations, (3) mucous patches, (4) chronic inflammation, with hypertrophy of the mucous membrane and vegetations.

Erythema.

Erythema of the larynx, unless it be very acute and attended by œdema, may be so slight as to attract no attention, the only symptoms being slight huskiness of the voice and moderate catarrh. No doubt it occurs during early skin eruptions, and it is frequently developed at more advanced stages, either independently or in connection with deep laryngeal lesions. There may be nothing in the appearance of the affection to distinguish it from a simple catarrh. It occurs either

in patches, which give the mucous membrane a mottled appearance, or it may be limited to certain regions, or it may be diffuse, the lining of the larynx having a uniform dusky-red hue. There may be superficial erosions of the mucous membrane.

Superficial Ulcerations.

The superficial ulcerations observed in laryngeal syphilis involve only the mucous membrane. They may affect phonation to some extent, but are generally very sluggish, persisting with slight change for an indefinite period. Their margins are well defined, quite regular, and very slightly elevated above the surrounding level. The surface of the ulcers is usually concealed by a layer of tenacious secretion. Frequently general erythema of the mucous membrane coexists.

When seated on parts exposed to irritation, either in respiration or in phonation, mucous patches of the larynx are prominent with ragged margins, forming what are known as CONDYLOMATA; in other regions they are flatter and the ulceration is more sharply cut. Their surface is covered by a scanty viscid secretion. The removal of this film exposes a red, excoriated surface in striking contrast with the paler hue of the surrounding mucous membrane.

Chronic inflammation of the larynx is very persistent, and commonly leads to thickening or *hyperæmia* of the mucous membrane.

Treatment.—The early efflorescences in the larynx usually disappear quite promptly under the influence of internal treatment. If they are obstinate, they usually yield rapidly to the nitrate-of-silver spray (gr. j–iv to ℥vij water).

Deeper lesions should be treated by occasional moderately strong cauterization (nitrate of silver or carbolic acid), followed by spraying with Dobell's solution. When there is ulceration, insufflation of equal parts of iodoform and boric acid is required.

MUCOUS PATCHES OF THE GENITAL ORGANS.

The most frequent seat of mucous patches in men is around the anus and within the mouth, and in women, upon the vulva. It has been asserted that they are much more frequent in the latter than in the former sex, but the difference is probably not so great as has been supposed. There is certainly no more common symptom in male patients affected with syphilis. They are also present in most cases of hereditary syphilis in infants, and, in consequence of the moist condition of the integument at this early stage, are not confined to the regions above mentioned, but may be scattered over the whole surface of the body, especially the nates and thighs.

The development of mucous patches is everywhere favored by inat-

tention to cleanliness, and in the mouth by the use of tobacco, either by smoking or chewing: in men who are habituated to these practices they constitute one of the most persistent and troublesome symptoms we have to deal with, and in dirty prostitutes of the lower class they are equally abundant and obstinate about the genital organs.

Mucous patches vary in appearance according to their situation. The chief points of difference are found between those seated upon the external integument and those upon membranes which are strictly mucous.

The former, which are met with for the most part around the anus and genital organs in the two sexes, consist of rounded disks, either single or aggregated, of a reddish or grayish color, granulated and elevated to the height of about a line above the integument, upon which they appear to be superimposed like a number of cones laid upon the part. They then receive the name of *condylomata*. Their appearance is so peculiar that when once seen they are readily recognized.

CONDYLOMATA LATA.

The mode of development of condylomata lata is as follows: A red spot first appears upon the skin, and a slight effusion takes place beneath

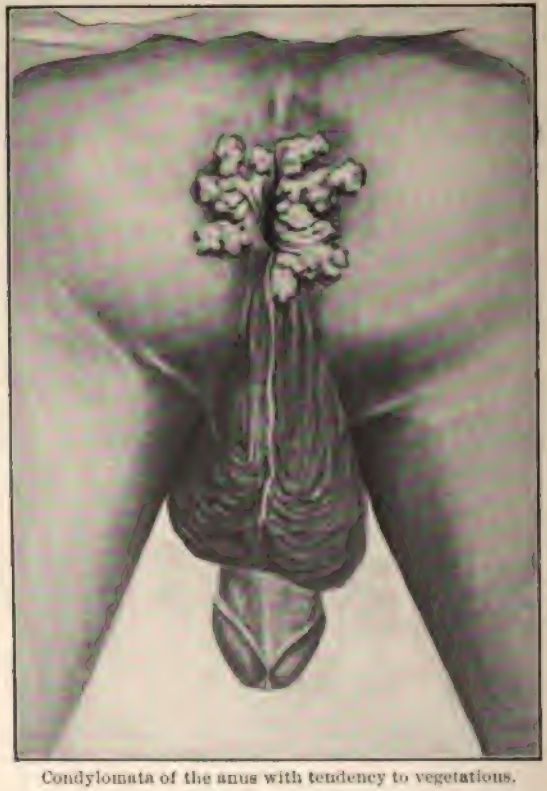
Fig. 138.

Condylomata lata of the vulva and anal region. On the latt[illegible] [illegible]us or vegetating appearance

the epidermis—sufficient to loosen it from the derma, but not to raise it in the form of a vesicle or bulla; the epidermis is removed by friction or falls off, and exposes a raw surface, upon which a moist grayish pellicle is formed; the surface is elevated by hypertrophy of the superficial layers of the skin, and gives rise to the broad, flat, wart-like disks referred to above.

In Fig. 138 condylomata lata situated around the vulva and anus are graphically portrayed. In Fig. 139 condylomata lata of the anus of a man are well shown.

FIG. 139.



Condylomata of the anus with tendency to vegetations.

Condylomata upon the vulva are generally elevated and of a reddish color. Those that occur within the vagina and upon the cervix uteri more closely resemble mucous patches upon the external integument than those situated upon other mucous membranes, as, for instance, within the buccal cavity.

Treatment.—In all cases of mucous patches or of condylomata lata on or about the genitals an energetic systemic treatment should be adopted. Locally, the prime essentials are absolute cleanliness, and a dry condition, and the covering of the parts by some protective sub-

stance, or the interposition of some absorbent material, cotton or gauze, between coapted surfaces. Black or yellow wash, applied on absorbent cotton, is very efficacious.

When these lesions are very large and papillomatous, they may be lightly and carefully touched with a solution of nitrate of silver (ʒj to water ℥j), with chloroacetic acid, carbolic acid, or, in very exuberant cases, with the acid nitrate of mercury. After these active cauterizations the parts should be well washed and dried, and then dusted with some inert powder, over which a layer of absorbent cotton should be placed. Aristol, resorcin, or calomel in combination with starch or boric acid forms a pleasant and effective application for continual use.

In women especially the parts should be kept extremely clean and dry. Hot intravaginal injections of bichloride of mercury and water (1 : 5000 or 1 : 3000) should be used several times daily. The genitals should then be dried and dusted with equal parts of calomel and starch, and an abundance of absorbent cotton should be applied by means of a bandage if possible. In some of these cases active cauterization, preferably with carbolic acid, should be used.

CHAPTER XXXIII.

SYPHILITIC AFFECTIONS OF THE HAIR.

ALOPECIA is one of the most common symptoms of syphilis. By reason of its prominence and of its compromising character it is the source of constant worry and annoyance to its bearer. It varies from slight to almost complete loss of hair, which is rarely permanent, and its course may be rapid or chronic. It is attended by no subjective symptoms, such as heat or itching, and in most cases there are no marked lesions of the scalp, while in other cases the hair-follicles may be attacked by macules, papules, pustules, or ulcers. The eyebrows, the beard, and moustache, the hair of the pubes and axillæ, may also be involved. The eyelashes are seldom attacked, except by ulcerative lesions, and alopecia never exists elsewhere without affecting the scalp. These may be called the essential alopeciæ, while loss of hair due to destructive or inflammatory lesions is a secondary form.

There are two varieties of syphilitic alopecia—one consisting of a simple thinning or more or less complete shedding of the hair, and the other of loss of the hair in tolerably circumscribed patches. They both occur with about equal frequency.

The first form of alopecia begins rather abruptly, and on each combing many hairs usually come away. On the scalp the result of this alopecia is generally striking, but it may be so slight as to pass unnoticed, the hair merely being thinned. The hair may be lost in one or more patches, which vary in size and occur without symmetry or order; they may be as large as the palm of one's hand, and several may fuse together. Their outline is irregular, and they show no tendency to assume a circular form. The surface of the patches is rather dry and somewhat scaly; the follicles are quite prominent, and scattered irregularly may be a few long hairs, sometimes one or more tufts, and minute hairs. The surface of the scalp is dry and presents a few furfuraceous scales. In patients who have been subject to seborrhœa capitis—or, as it is generally known, pityriasis capitis—this condition is often much more marked.

Patients, especially men, who have suffered from this form of baldness not infrequently get into a state of mind in which, after the cessation of the fall, nothing can convince them that the affection does not yet continue. They come regularly with their complaints and sorrows, and often vainly pass their fingers through their hair, hoping to bring away a few with which to convince the surgeon that the affection is still

active. In most cases this delusion is dispelled after a time. In Fig. 140 this form of alopecia is well shown. The general diffuse shedding of the hair of the scalp is typically portrayed. In this case there was loss of eyebrows and eyelashes.

FIG. 140.

The diffuse shedding form of syphilitic alopecia.

The second or patchy form of syphilitic alopecia presents such striking features that when it is once seen it is thereafter readily recognized by the surgeon. The surface of the scalp presents a moth-eaten or mangy appearance. The hairs are generally dry and lustreless, giving the appearance of malnutrition. The bald patches are of irregular round or oval outline, and from fusion they become gyrate. The scalp is dry, scaly, and generally unhealthy in appearance. The hair-follicles are prominent, and from some of them stumpy hairs protrude.

This form of alopecia (admirably portrayed in Fig. 141) is usually most severe on the back and upper portions of the head, and less so on the sides and frontal region. It runs a chronic sluggish course.

The hair-follicles may be involved by erythematous spots, papules,

or pustules coincidently with a general eruption. In such cases the loss of hair is generally slight and scattered. The arch of the eyebrows may be interrupted by the fall of a few hairs or may be totally destroyed, giving the patient a very peculiar appearance. In the beard, in the

Fig. 141.

The moth-eaten form of syphilitic alopecia.

axillæ, and upon the pubes the loss of hair may also be partial, complete, or in patches.

Syphilitic alopecia is peculiar to the secondary period, and generally begins about the third month, at the decline of the earlier secondary symptoms. It may occur at any time before the end of the second year, and is very frequently associated with cachexia.

When ulcerative changes occur in the follicles, or when pustules attack the scalp, and sometimes even when erythematous spots and papules occur, the papillæ may be destroyed and the follicles become obliterated, permanent baldness resulting. This happens in a marked degree in connection with late tubercles and gummatous ulcers.

Diagnosis.—The diagnosis of syphilitic alopecia is to be made from pityriasis capitis (seborrhœa), senile baldness, and alopecia areata. The suddenness of invasion and the generally marked character of the baldness in syphilitic alopecia and its non-inflammatory course are in marked contrast with the chronic course and the scaly and somewhat pruritic condition of pityriasis capitis. Moreover, the suspicion of syphilis is confirmed by the history of the case and the discovery of other specific lesions.

Senile alopecia—incorrectly so called, since it usually begins in middle life—extends backward from the forehead or begins at the vertex, and is wholly unlike the syphilitic affection. Moreover, the scalp is smooth and shiny, and the follicular openings are no longer visible.

Alopecia areata is much more common in children than in adults, and occurs in round, oval, or serpiginous patches, the hair on other parts of the scalp being preserved. The surfaces of the patches are very smooth and polished, and of a yellowish-white color; they are not scaly, and are completely destitute of hair.

The **prognosis** of syphilitic alopecia is, in general, good. In some cases the loss of hair is so extensive and its renewal so slow that permanent baldness seems to be inevitable. The main points upon which to base the prognosis are the extent of the baldness, its duration, and the patient's general health. If the affection has been severe and has existed for some time, if treatment has been neglected and incomplete, and if cachexia has taken place, the prognosis must be very guarded.

Treatment.—Cases of syphilitic alopecia call for a vigorous local and constitutional treatment. If possible, inunctions should be used on the neck and especially the upper parts of the body. The hair of the scalp should be cut off quite close, and, if expedient, should be shaved, and frequent shampooing is very beneficial. Every day the affected parts, and indeed the whole scalp, should be well rubbed with an ointment composed of white precipitate (30 grains) and cold cream (1 ounce). This application may be made at night. The parts should be well washed with soap and water in the morning, and twice during the day they should be vigorously rubbed with a bichloride solution (1 : 500 or 1 : 250).

CHAPTER XXXIV.

SYPHILITIC AFFECTIONS OF THE NAILS.

SYPHILITIC affections of the nails are of two varieties: in one, called *onychia*, the disease begins primarily in the nails themselves; and in the other, called *perionychia*, it begins in their vicinity and involves them secondarily. Their course is chronic, and may be mild or severe and destructive. They generally appear within the first two years following syphilitic infection, but their invasion may occur much later.

In syphilitic *onychia* the changes may be dry and confined to the nail-substance or the nail may be separated from its bed.

In the dry form, *onychia sicca*, the nail gradually loses its lustre and transparency at its free edge and assumes a dull-yellow color; sometimes the disease is limited by a distinct line of demarcation or the whole nail may be involved. The edge of the nail becomes thickened and brittle, readily cracks, and may be deeply serrated (Fig. 142).

FIG. 142.

Dry onychia.

Its surface is rough, and presents shallow, longitudinal fissures and minute depressions, in which dirt collects. In some cases the morbid process begins as a small pinkish, perhaps scaly, spot limited to one segment of the reflection of the integument, just at the sulcus. From this focus the chronic inflammatory process extends both along the sul-

cus and into the nail, which it literally destroys. The epidermis under and beyond the free margin is usually thickened and scaly. Very often there is but slight inconvenience from the disease, and the deformity may be remedied by careful paring of the nail. In some cases, however, the process becomes so intense that the whole nail is converted into an irregular rough plate, causing great deformity of the hands, which is very annoying to patients.

Treatment results in the gradual pushing forward of the diseased portion, leaving a healthy nail.

There is also an *hypertrophic onychia*, in which the thickening of the nail is excessive. It involves the nails of the fingers more frequently than those of the toes, and usually attacks more than one nail. This hypertrophic state is well shown on the nail of the thumb in Fig. 142.

There is also an affection of the nails, of which I have seen several well-marked instances in men suffering with syphilitic cachexia, which seems to be a *local necrosis*. The nail becomes opaque and whitish, in spots the size of a pinhead. These spots, of which there may be from two or three to ten, are formed by depressions of the surface of the nail, which finally reach the matrix, leaving minute and sharply cut holes. In some cases the necrosis is superficial, and the whole thickness of the nail is not perforated. When this occurs the nail presents much the appearance of the roughened surface of a thimble.

Perionychia.—There are three forms of *perionychia*—an ulcerative, an indolent (which is usually non-ulcerative), and a diffuse form.

The *non-ulcerative* form may attack the entire attached margin of the nail or its lunula or one of its lateral margins. The border of the nail, to the width of about one line, is thickened in consequence of specific infiltration, and there is a more or less complete papular rim around it. The color is dull red, which pales on pressure, and the surface is slightly scaly. This condition may persist for a long time, until the nail becomes of a dull color and is traversed by shallow transverse furrows, showing impaired nutrition. As a result of pressure or irritation ulceration may occur at the angle of reflection of the skin, and may extend beneath the nail, which is finally loosened and thrown off.

Ulcerative perionychia occurs at any time during the secondary period, and varies greatly in severity. It may begin as a papule or a pustule at some part of the nail-margin, or a small ulceration or fissure at the lunula is the change first noticed. In either case the inflammation gradually increases, and ulceration extends along the sulcus at the attached margin of the nail. The process may be limited to the lunula or to a portion of the nail-border, or it may involve the entire length of the sulcus. When the lunula is invaded the affection is very obstinate; the base of the nail soon loses its transparency and becomes

detached to the extent of about a line. The ulceration, which extends under the nail itself and may be for a time inaccessible, constantly secretes an offensive pus. The whole nail may be gradually undermined, or the parts may be denuded to a limited extent by destruction of the attached margin.

When the ulceration, which is likely to be particularly intense at the lunula, is severe, the whole matrix becomes involved, and after the nail has been thrown off it presents a yellowish, somewhat pultaceous surface, surrounded by the swollen and ulcerated nail-margin. Soon the ulceration shows a tendency to localize itself at the basal margin, while the surface of the matrix becomes covered with a dirty-yellow, firm, and uneven epithelial tissue.

If the base of the nail has not been too extensively destroyed, it retains a surprising degree of reparative power. A new nail appears and covers the matrix, unless it be excessively hypertrophied, and may be quite as good as the original nail. In some cases a perfect nail results only after several renewals.

In persons whose hands are exposed to irritants perionychia may begin under the free edge of the nail, generally of the index or middle finger. Slight pain attracts the attention of the patient, and he finds a brownish-red crust beneath the nail, removal of which exposes an ulcer extending along more or less of the nail's breadth.

The third or *diffuse* form of perionychia begins as a hyperæmia which is bright, diffuse, and not limited to the nail. For two or three weeks the case may present simply a reddened condition of the distal portion of the affected fingers. There may be no pain at first. In this very subacute manner the bright red deepens to a coppery hue, and the affected parts become swollen and bulbous or of the shape of an Indian club, due to syphilitic inflammation and infiltration. Coincidently with the intensification of the disease the nails become affected and are destroyed, seemingly as if struck by a blight.

This rapid necrosis is peculiar to this form of perionychia. The nail first loses its color, which becomes dull and dark, then its attachment at each border gives way first, and after that in its whole extent ulceration with the formation of a thick, ill-smelling pus taking place beneath it. The nail then rapidly becomes considerably swollen, uneven, and puckered, and of a black and green color, well shown in Fig. 143.

Separation of the Nail.—Separation of the nail takes place not infrequently in the early part of the secondary stage of syphilis, and may be partial or complete. The process may be so insidious and it may cause so little inconvenience, especially with careless persons and when the toe-nails are affected, that several nails may fall off without attracting the notice of the patient. It begins at the free border

of the nail, being limited at first to a portion of its breadth (Fig. 143).

Fig. 143.

Diffuse perionychia.

It gradually extends toward the base of the nail, involving one-third to one-half its length, and possibly its entire breadth. In neglected cases the whole nail may be affected and thrown off. The diseased por-

Fig. 144.

Separation of the nails.

tion of the nail assumes a greenish-brown color, and the matrix beneath presents more or less healthy granulations. When the destruction of the nail has been partial the healthy portion pushes forward and covers

the denuded parts: when it has been complete, an entirely new nail is formed. Only one nail may be affected, or several may be involved simultaneously or in succession, those of the hands more frequently than those of the feet. (See Fig. 144.)

With the onset of the nail-affections pain becomes an important element in the case, and the fingers are then useless for any function. The imbedded portion of these appendages is the one which gives the most trouble. Here the destructive process is usually not sufficiently great to cause the spontaneous extrusion of the nail, and this sequestrum remains, causing severe pain, acting as a foreign body, and keeping up the ulcerative process. So severe may be the inflammation that the forearm and arm become red, swollen, and painful, with sympathetic implication of the axillary glands, attended by high fever, malaise, and much suffering. When, however, the dead nail is removed and appropriate treatment is adopted, the coppery-red phalanx loses its tension, becomes superficially wrinkled, and of a purplish-red color.

All forms of syphilitic perionychia are very chronic, rarely lasting less than one or two months, and sometimes continuing a year. At first they may cause scarcely any inconvenience, and for this reason they are often neglected.

The nails of the fingers and of the toes are attacked with equal frequency, those most used and most exposed being the most liable. In general, only one finger is affected, sometimes a finger of each hand, or two fingers of the same hand, either simultaneously or more commonly, in succession. In some cases all the nails become affected.

Diagnosis.—Chronic eczema and psoriasis of the hand are sometimes followed by changes in the nail similar to those of syphilitic friable onychia. The question may be settled by the previous history of the case.

I have seen two cases of separation of the nail, in every particular similar to that produced by syphilis, in which that infection did not exist.

Ulcerative perionychia has been mistaken for the initial lesion of syphilis.

Severe perionychia resembling the syphilitic form is sometimes seen in broken-down and cachectic subjects. Its occurrence should always excite the suspicion of syphilis.

Prognosis.—The prognosis of friable and of hypertrophic onychia is good, since its course is generally mild and transient. The same is true when separation of the nails occurs, the morbid condition being soon relieved by proper treatment.

The ulcerative forms are always troublesome and often very painful affections, and the prognosis should always be guarded. The earlier separation of the nail occurs and the focus of the disease at the base of

the nail is reached by local applications, the sooner may relief be expected. New and comely nails sometimes develop even after prolonged and intense basal ulceration. In nearly all cases where the perionychia is lateral or at the free border of the nail a perfect nail may be predicted.

The growth of the new nail is very slow, and the spiculæ at the edges and the uneven plates which often form on the surface of the matrix are important indications of retention of the nail-producing power. The new nail is often imperfect at first, being ridged and irregular, and it is sometimes permanently shorter than the old one.

Treatment.—Active internal treatment is required in all forms of syphilitic affections of the nails.

Friable onychia calls for no other local treatment than careful trimming of the nails and prevention of irritation. The severe forms of dry onychia are often very intractable, and require active local treatment. The fingers should be soaked twice daily in hot bichloride solution (1 : 1000), and mercurial ointment should be well rubbed in and kept on the parts.

In case of separation of the nail exposure of the matrix and the application every day or two of liquor potassæ, followed by the use of an ointment composed of one part of mercurial and two parts of diachylon ointment, will arrest the disease. The simple form of perionychia may be cured by the use of this ointment.

In ulcerative perionychia the diseased surface should be exposed as soon as possible, and cauterized with nitric acid or a strong solution of nitrate of silver, allaying inflammatory reaction with water dressings. Subsequently iodoform or powdered nitrate of lead may be applied, and the phalanx be enveloped in diachylon ointment. The profuse granulations of the matrix may require the use of a strong solution of caustic potassa (ʒj–ʒij or iv to water ℥j). Prolonged immersion of the hand in very warm bichloride solution (1 : 1000) diminishes the swelling and removes the secretions. The application of a bandage over the ointment, India-rubber finger-stalls, or gutta-percha tissue, may serve to reduce the swelling. Care must be taken to apply the pressure gradually.

In addition, zinc and belladonna ointments or Goulard's extract may be used to meet special indications.

CHAPTER XXXV.

SYPHILITIC AFFECTIONS OF THE EYE.

WITH the great variety of tissues represented in the eye and its appendages, the ocular manifestations of syphilis are manifold. They are met with in every stage of the disease, ranging from the initial lesion on the lid to the late affections of the nerves. Ocular manifestations, moreover, are found in a considerable percentage of cases of syphilis, and frequently they are the first symptoms of the disease to lead the patient to seek medical advice. Not infrequently they are the most serious manifestations that occur. Therefore, a consideration of the eye symptoms present or past is often of essential importance in establishing the diagnosis of syphilis.

LIDS AND CONJUNCTIVA.

When a secondary eruption appears on the forehead or nose the upper lids are usually involved, and a falling of the lashes may accompany alopecia of the scalp. A simple catarrhal conjunctivitis is common at this time. Later, papules and tubercles may appear on the lids, or, more rarely, on the conjunctiva, and by breaking down may form shallow ulcers.

Still later, true gummata may develop as single or multiple dusky-red tumors, much resembling the simple tumors of the Meibomian glands, but being movable over the tarsus. They may run a chronic course, or they may develop quickly with inflammatory signs and rapidly break down. There is then formed either on the cutaneous or the mucous surface of the lid a deep, sloughing ulcer with reddish, notched margins, which is sometimes confounded with lupus or epithelioma, particularly as the auricular glands are enlarged in all these conditions. In its cicatrization the gummous ulcer leads to great distortion of the lid.

Finally, the dense connective tissue of the tarsus of the upper lids may undergo a chronic, diffuse, gummous infiltration, known as syphilitic tarsitis. This is often accompanied by thickening of the mucosa and œdema of the subcutaneous tissue, so that the entire lid is uniformly swollen, and from its increased weight droops down over the pupil.

LACHRYMAL APPARATUS AND ORBIT.

Catarrhal and purulent inflammations of the lachrymal sac (dacryocystitis) are not infrequently seen in both hereditary and

syphilis, and are brought about by any permanent obstruction to the passage of tears down the nasal duct. Such obstruction is usually due to occlusion of the nasal opening of the duct from swelling or cicatrization of the nasal mucosa, or to disease of the bony wall of the canal higher up.

Lachrymal affections are seen in persons with hereditary syphilis in whom the nose is much sunken and malformed, and in persons with acquired syphilis in whom there is necrosis of the lateral bones of the nose.

Operative measures to relieve lachrymal obstruction are now less frequently employed than formerly, and probing is not so confidently resorted to.

Phlegmonous inflammation of the lachrymal sac requires early incision, and annoying chronic purulent inflammations may necessitate obliteration of the cavity of the sac by the use of caustics, or the complete extirpation of the sac.

The syphilitic affections of the orbit are usually primarily periosteal, and they arise late in the course of the disease. This periostitis varies greatly in nature, location, course, and complications. It may be distinctly gummous and nodular, or it may be diffuse. The margins of the orbit are more frequently affected than the deeper parts. The affection when due to syphilis is more frequently chronic than acute, the acute cases mostly being traumatic. Starting in the periosteum, the inflammation at times involves also the cellular tissue of the orbit, giving rise to phlegmon—a serious condition which may injure the optic nerve, or destroy the eye, or even lead to a purulent meningitis that is fatal. On the other hand, a primary periostitis at times affects the nutrition of the underlying bone, leading to caries or necrosis of the orbital walls, with the formation of fistulous tracts which in their cicatrization distort the lids and leave ugly indrawn scars.

When the periostitis is near the margin of the orbit there will be pain and tenderness on pressure, œdema of the adjacent lid, chemosis of the bulbar conjunctiva, and perhaps displacement of the eyeball in a direction away from the inflamed area. When the periostitis is deep in the orbit there will be œdema of both lids, chemosis of the conjunctiva, and exophthalmos with diminished mobility of the eye and pain, and, at times, also, optic neuritis and paralysis of the muscles of the eye from pressure on the orbital nerves.

The **treatment** of suppurative cases is deep incision of the orbit with a narrow-bladed knife as soon as fluctuation can be obtained. Active constitutional treatment is always indicated, and, when bone is diseased, an earnest attempt is to be made to remove the affected por-

SCLERA AND CORNEA.

The affections of the sclera and the deep non-ulcerous affections of the cornea are caused by endogenous infection, and are due to syphilis, rheumatism, gout, and the like. Rarely occurring in the course of acquired syphilis, they are very frequent in the hereditary variety, and hence when due to syphilis these affections usually appear in early life.

Scleritis is generally divided into episcleritis, and true or deep scleritis. Episcleritis usually occurs late in life, and is not often of syphilitic origin. It appears as a single patch or elevated nodule of infiltration in the episcleral tissue near the cornea. The affection is usually acute, and it runs its course without leaving any trace, but it is prone to recur.

True scleritis is a chronic affection of early life, usually associated with and dependent upon chronic cyclitis, and leading often to deep infiltrations of the cornea. There may be a diffuse thickening of the sclera over a considerable area, or there may be several nodular thickenings. The affected area lies near the cornea and is of a deep purple color. The infiltration leads to a softening of the component fibres of the sclera, which break down, so that the sclera in time becomes thin and translucent and the uveal pigment shows through. Later, the thinned area may yield to the intra-ocular pressure, particularly if this has been increased by uveal complications, and an ectasia results.

In the way of **treatment** hot fomentations are used, and atropine when there is iritis, and constitutional remedies. The prognosis, however, is unfavorable.

Gumma of the sclera is seen occasionally, either arising primarily in the sclera or extending there from gumma of the ciliary body.

The deep non-ulcerous inflammations of the cornea which are due to syphilis are of the following varieties: typical parenchymatous or interstitial keratitis, parenchymatous punctate keratitis, sclerosing keratitis, and gummata in the cornea.

Typical parenchymatous keratitis is sometimes seen early in the course of acquired syphilis, is sometimes due to uveal tuberculosis, and in a few cases no cause can be discovered; in general, however, it is, as Hutchinson first pointed out, a characteristic symptom of inherited syphilis. It is met with most frequently between the ages of six and twenty, occasionally between twenty and thirty, and rarely after thirty.

At the beginning of the affection a few punctate, linear, or patchy opacities of pale bluish-gray color are seen scattered through the deeper layers of the cornea, unaccompanied by marked signs of inflammation. These small opacities soon multiply and coalesce until the greater portion of the cornea is diffusely hazy and of a milky hue, or comes to have the appearance of ground glass. Sooner or later signs of a mild iritis

appear, and there is circumcorneal injection with photophobia and lachrymation, which increase later when the cornea becomes vascular.

After some weeks or months new-formed vessels start from the margin of the cornea and run toward its centre. These vessels, for the most part, lie deep in the corneal substance, and run parallel to one another, without branching, and they may be present in such numbers as to form a distinct red spot. The bright scarlet color of the vessels, however, is paled by the overlying corneal opacities, and the result is the "salmon patch" of Hutchinson.

With the vascularization, the corneal opacity gradually clears up from the periphery, remaining longest in the centre of the cornea, where the absorption is rarely so complete that characteristic opacities do not permanently remain. The course of the disease is essentially chronic, as it lasts from six to eighteen months, and is prone to relapse. The affection is almost always bilateral, the second eye being attacked a few weeks or months after the first.

At the outset, so varying is the clinical picture, the diagnosis may be quite difficult, but corroborative evidence can be obtained merely by observing the head, which usually presents stigmata of hereditary syphilis: the frontal eminences are prominent, the bridge of the nose sunken, the skin pasty, with linear scars about the nostrils and the angles of the mouth, and the secondary central incisor teeth notched. Furthermore, the lymphatic glands generally are slightly enlarged and hard, and nodules are often to be found on the tibias.

Pathologically, parenchymatous keratitis is now regarded as an affection accessory to, and in a way dependent upon, disease of the uveal tract.

The local **treatment** is directed particularly against the iritis, the pupil being kept fully dilated with atropine to prevent the formation of posterior synechiæ. Warm fomentations are employed, and the eyes are protected from the light. Antisyphilitic treatment does not perceptibly shorten the course of the disease, and, while it is customary to employ it, it must be supplemented with tonics and hygienic regulations. After the absorption of the opacities is well under way it may be hastened by the sparing use of irritants, such as 1 per cent. yellow oxide of mercury ointment, or wine of opium and water in equal parts.

Parenchymatous punctate keratitis, which was first described by Mauthner, is a rare affection occurring in the early stages of acquired syphilis. It is characterized by the presence of a number of discrete grayish dots, of pin-head size, lying in the deep layers of the cornea, and it is not accompanied by diffuse haziness or vascularity of the cornea or by any signs of iridocyclitis. It is to be distinguished clinically from *superficial* punctate keratitis, a commoner affection, in which small nodules lie near the surface of the cornea, elevating its epithelium.

And it is not to be confounded, because of its name, with the condition formerly called punctate keratitis, in which products of uveal inflammation are deposited on the posterior surface of the cornea in its lower half.

A rare variety of syphilitic punctate keratitis, somewhat allied to typical parenchymatous keratitis, presents the gray punctate opacities, but they are accompanied by diffuse opacity of the cornea and by iritis.

Sclerosing keratitis sometimes occurs late in the course of syphilis, although it is more frequently seen in persons with rheumatism or gout. It is to be regarded as a component of the complex affection generically known as uveitis anterior. This is a chronic, relapsing, alternating inflammation of the various parts that are nourished chiefly by the anterior ciliary arteries, viz., the ciliary body and iris, the sclera, and the cornea. Following a chronic infiltration of the ciliary body and sclera, a dense yellowish-gray opacity appears in the contiguous sector of the cornea, and, later, it becomes white or bluish-white, resembling a continuation of the sclera. This opacity, unlike that of ordinary parenchymatous keratitis, shows little tendency to undergo absorption.

True gummata may appear in the cornea in the late stages of syphilis.

IRIS AND CILIARY BODY.

Iritis may be due to syphilis, rheumatism, gout, diabetes, or gonorrhœal rheumatism. More than one-half of the non-traumatic cases of iritis, however, are due to acquired syphilis, and hence iritis is almost as characteristic a symptom of acquired syphilis as parenchymatous keratitis is of hereditary syphilis. In hereditary syphilis uncomplicated iritis is not common.

The process in iritis consists in hyperæmia and infiltration of the iris and ciliary body and in exudation into the aqueous and vitreous humors. The character of the exudation determines the clinical variety, iritis being classified as plastic, serous, spongy, and purulent.

Plastic iritis when due to acquired syphilis is seen most frequently within the first year of the disease, and it often appears with the first eruption on the skin. Both eyes may be affected, either together or successively. At the outset the patient notices an injection of the eyeball, with photophobia, lachrymation, pain not only in the eye but also radiating from it to the forehead and temple, and blurring of vision. When examined there is seen a dark purplish-red zone of circumcorneal injection, and the iris appears dull and lustreless, and so swollen that the surface-markings are obscured. The pupil is small, irregular in shape, and responds to light but slightly, if at all. The aqueous and vitreous humors are cloudy, and deposits of exuda-

tion lie on the posterior surface of the cornea and the anterior surface of the lens. When the pupil is dilated with atropine the margin of the iris is found to be bound down to the lens here and there by posterior synechiæ, so that the outline of the pupil is notched and irregular. With the continued use of atropine the adhesions are often broken up.

Iritis, in acute cases, runs its course in from four to eight weeks. The swelling and discoloration of the iris then disappear and the exudations are absorbed. Relapses are frequent, however, and recurrence is not uncommon. It frequently happens that some posterior synechiæ persist, or pigmented spots where synechiæ have existed remain on the anterior surface of the lens, indicating ever afterward that there has been iritis.

If the pupil is not kept fully dilated with atropine, organized adhesions form, binding the whole pupillary margin of the iris down to the lens, and a dense membrane may develop in the pupil. The aqueous humor is then unable to pass from the posterior to the anterior chamber to gain its channels of outlet, and a glaucomatous condition is set up which requires iridectomy.

In the plastic iritis of the early stage of syphilis one or more nodules may form at the pupillary margin or occasionally at the ciliary margin of the iris. These are granulation tumors corresponding to papules or condylomata on the skin, and are characteristic of syphilis. They may undergo necrosis and disappear without leaving a scar, and the yellowish débris sinking down to the bottom of the anterior chamber may give rise to the clinical picture of hypopyon, but true purulent iritis with hypopyon is rarely due to syphilis.

In the later stages of syphilis true gummata sometimes appear in the iris and lead to considerable destruction of tissue, or gummata form in the ciliary body and sometimes lead to perforation of the ball.

The patient with plastic iritis is kept in bed in a darkened room; leeches may be applied to the temple; 1 per cent. atropine solution is instilled often enough to keep the pupil fully dilated; hot fomentations are used frequently; constitutional treatment is instituted; and one of the coal-tar analgesics is at times required to relieve the nocturnal pain.

Serous iritis is less frequent than plastic and is less frequently due to syphilis than to rheumatism. Pathologically it is rather a cyclitis than an iritis. The subjective symptoms are like those of plastic iritis, and the same circumcorneal injection is present; the pupil, however, may be of natural size or even somewhat dilated, the swelling of the iris may not be marked, and adhesions to the lens, if they exist, are usually so slight as to be easily broken up. The characteristic symptom is the presence on the posterior surface of the cornea, in its lower half.

of fine punctate deposits, usually yellowish in color, but sometimes pigmented, which are often arranged in the form of a triangle with its apex up. The affection at times may be a cyclitis purely; the iris then is of normal appearance, but the eyeball, besides being painful, is very sensitive to pressure in the ciliary region.

In serous iritis, as in all affections in which the ciliary body is involved, disturbances of intra-ocular tension are frequent; and, while atropine is indicated, as a rule, the tension must be watched and any increase appropriately treated.

Spongy iritis is rare, and is not often due to syphilis. In this variety of iritis the fibrin-forming elements of the blood are poured out and a yellowish-gray coagulum, resembling a dislocated crystalline lens, fills the entire anterior chamber. This coagulum gradually undergoes absorption and, as it becomes smaller, sinks down to the bottom of the chamber.

CHOROID AND RETINA.

The choroid, with its rich vascular supply, nourishes the non-vascular outer layers of the retina, and in inflammations of the choroid these outer layers of the retina suffer also, so that the ordinary inflammation is properly a chorioretinitis. The retinal vessels supply the inner layers of the retina, and an inflammation arising in the retina usually remains limited to these layers, and is properly a retinitis of the inner layers.

These affections of the background of the eye do not cause pain or external evidences of inflammation, and the chief subjective symptom is a disturbance of vision, which may be so slight as to pass unobserved by the patient. When the inflammatory foci are in the macular region, however, gaps will be noticed in the field of vision and objects observed will often appear distorted and altered in size.

The affections of the choroid that may be due to syphilis, occurring as late symptoms, are, in the order of their frequency, chronic disseminate choroiditis, acute exudative choroiditis, and choroiditis as a part of a general uveitis. These inflammations in the majority of cases are not syphilitic, and a constitutional cause cannot always be discovered. Disseminate choroiditis is a very chronic affection, characterized by the presence of yellowish or reddish foci of infiltration, usually as large as the optic disk or larger, scattered through the fundus. The choroid undergoes atrophy in the affected areas and finally the sclera shows through as a white patch bordered by a zone of pigment.

The vitreous may be slightly cloudy, but, if the foci are peripheric and do not affect central vision, the disease may pass unnoticed for years.

In hereditary syphilis it is usual to find a disseminate choroiditis localized in the anterior segment of the choroid near the ora serrata, and with this there may be pallor of the optic disk and constriction of the retinal arteries, central vision, however, being normal.

Areolar choroiditis is a form of chronic choroiditis characterized by the presence of black patches near the posterior pole of the eye, which later often become lighter in their centres.

In cases of extensive choroiditis there may be a general absorption of the pigment from the pigment-epithelium and a deposition of it in branched figures in the inner layers of the retina. This condition is sometimes confounded with retinitis pigmentosa, but the latter affection does not exhibit visible changes in the choroid, and it is never due to syphilis.

Acute exudative choroiditis begins as an elevated yellowish patch of infiltration, usually oval in form, with its outlines blurred from the haziness of the overlying retina. There may be hemorrhages in the retina about the patch, and the retinal vessels near it may be dilated. Furthermore, the optic disk may be swollen, particularly on the side toward the patch, and present the picture of optic neuritis. Very soon membranous opacities appear in the vitreous over the patch, and a diffuse haziness of the entire vitreous blurs the sight. The fundus may then be so obscured that the diagnosis is difficult, but a small absolute scotoma can usually be made out in the visual field and the inflammatory patch can thus be located.

In a month or two the opacities of the vitreous clear up, the choroidal exudation is absorbed, the choroid and outer layers of the retina atrophy, and the sclera then shows through as a white patch crossed by a few remaining choroidal vessels and surrounded by a zone of pigment.

A central chorioretinitis of rare occurrence is that form in which the exudation into the tissue is not absorbed, but becomes organized, and there remains instead of the usual atrophic spot a thick elevated patch of new connective tissue.

Diffuse choroiditis appears at times as a component of a general uveitis. The nutrition of the lens and vitreous is interfered with, there are marked disturbances of intra-ocular tension, and the final outcome of the process may be atrophy of the eyeball.

In the **treatment** of choroiditis, rest and the protection of the eyes from bright light are to be enjoined, and the constitutional remedies employed will be either alterative or tonic, according to the patient's physical state and the acuteness of the local **affection.**

Syphilitic retinitis may appear either as an **earl**[illegible] [illegible]**ani**-festation. It is rare as compared with **retinit**[illegible]

diabetes, and lesions of the circulatory system. In the severe cases the entire retina becomes diffusely hazy, but more markedly so near the optic disk where the nerve-fibre layer is thickest. The disk itself is swollen and the retinal veins are large and tortuous. Occasionally there are hemorrhages or yellowish exudations along the larger vessels. If there is a complicating choroiditis there may be a very dense diffuse cloudiness of the vitreous, obscuring the fundus. In milder cases the retinal vessels are not much changed in size, and portions of the retina appear merely veiled by a faint bluish-gray haze, which may be so tenuous as to escape detection. The extent of the affected areas can, however, be mapped out in the visual field by delicate tests, such as using colored test-objects or pale gray test-objects on a white ground.

The affection runs no regular course, but undergoes rapid variations and is very chronic. It may pass off, however, leaving the vision little impaired. Energetic constitutional treatment is demanded.

A relapsing central retinitis of syphilitic origin has been described by Graefe, in which a slight cloudiness appears at the macula lutea, causing a relative central scotoma, and then disappears to recur again and again, until eventually central vision is permanently impaired.

OPTIC NERVE.

The syphilitic affections of the optic nerve are usually quite late manifestations of the disease. They include both inflammations and degenerations, and they differ in general from similar affections due to other causes in their rapid variations and in their tendency to improve under treatment.

A papillitis involving only the bulbar end of the nerve always accompanies the severer forms of syphilitic retinitis. There is then moderate swelling of the optic disk, with dilatation of the veins and narrowing of the arteries; but with the subsidence of the retinitis the disk may regain its normal appearance, and vision may become perfect again.

Retrobulbar neuritis with central scotoma is rare in syphilis.

Optic neuritis of low degree without much involvement of the adjacent retina is a very frequent accompaniment of syphilitic inflammatory deposits at the base of the brain. The dura particularly is disposed to gummous thickenings, and if this new-formed material involves the optic nerves, chiasm, or tracts there is set up a slight bilateral optic neuritis. This neuritis is very chronic, but it may not greatly impair vision, and it can be held in check by constitutional treatment.

An excessive bilateral papillitis, or choked disk, which after a time may rapidly destroy vision and later present the picture of post-neuritic atrophy of the nerve, comes on in many cases of intracranial gumma.

It does not differ from the choked disk of other brain tumors, but it requires very energetic constitutional treatment, for the patient may recover from the other effects of the gumma and remain completely and permanently blind from the papillitis which the gumma has set up.

Unilateral choked disk may be brought about by gumma of the orbit, which at the same time causes exophthalmos and often paralysis of the ocular muscles from pressure upon the orbital nerves.

In syphilitic simple or non-inflammatory optic-nerve atrophy the optic disk grows pale, but it always remains sharply outlined and the retinal vessels for a time preserve their normal size. Late in the course of the affection the optic disk grows perfectly white and the retinal vessels become narrow. This atrophy is a degeneration of the optic fibres due to compression somewhere in their course, either from neoplastic tissues without, or from inflammatory changes within, the nerve or tract, but so far back that they do not reveal themselves by signs of inflammation in the optic disk.

In atrophy due to softening of the basal optic centres on one side or to pressure on one optic tract there is homonymous hemianopsia. Pressure on the middle portion of the chiasm produces bitemporal hemianopsia. But, as a rule, there is diffuse pressure upon the chiasm and the adjacent portions of the nerves and tracts, producing a concentric contraction of the field of vision in each eye.

Constitutional **treatment** will sometimes check the failure of vision or even bring about improvement. In this respect syphilitic optic-nerve atrophy differs from tabic optic-nerve atrophy; for however important the *rôle* of syphilis may be in the production of tabes, tabic processes are rather hastened than retarded by antisyphilitic treatment, and tabic optic-nerve atrophy, in spite of treatment, steadily progresses.

MOTOR NERVES.

Paralyses of the ocular muscles are perhaps, in the majority of cases, due to syphilis. These paralyses may be brought about in a variety of ways. Thus, the nerve-trunk may suffer compression from deep orbital periostitis, gumma at the base of the brain, basilar meningitis, and the like. The sixth nerve is then frequently affected, since it has the longest course on the floor of the skull and is the most exposed nerve in the sphenoidal fissure. The third, fourth, and fifth nerves also may be affected, and optic neuritis may develop.

Again, the nuclei of the nerves may be affected by changes in the vessels supplying them, or by chronic polio-encephalitis superior. In this case the nuclei for single muscles may be affected, giving rise to isolated paralysis, such, for [illegible] superior oblique, or of the ciliary muscle and [illegible]

Or, again, there may be progressive involvement of the nuclei, causing paralysis of one muscle after another in both eyes, together with anosmia, facial paralysis, and, later, simple atrophy of the optic nerves.

Cortical and subcortical lesions also give rise to ocular-muscle paralysis, but in this case usually a number of muscles will be affected simultaneously, and other motor disturbances will be present. An isolated unilateral ptosis, however, may occur with a cortical lesion of the opposite side.

An increasing pressure on the third-nerve trunk from syphilitic deposits will cause paralysis of one after another of the muscles supplied by this nerve, the levator of the upper lid often being the first to suffer. Unilateral ptosis, therefore, when not congenital, usually indicates syphilis.

The syphilitic paralyses may pass off in the course of weeks or months, but they are often resistant to treatment, and are at times permanent. Tabic ocular-muscle paralyses, with which these are not to be confounded, usually are recovered from quickly, but are prone to recur.

Antisyphilitic **treatment** is to be pushed, and, if the diplopia is annoying, a ground glass may be worn before one eye, shutting off one of the double images. If, after months of treatment, the function of a paralyzed muscle is regained in part, but not completely, the muscle may be advanced with tenotomy of its antagonist, or its synergist in the other eye may be tenotomized.

CHAPTER XXXVI.

SYPHILITIC AFFECTIONS OF THE EAR.

SYPHILITIC affections of the ear are rare as compared with syphilitic affections of the eye, and few of them are characteristic.

EXTERNAL EAR.

Cutaneous manifestations of syphilis occurring on or about the ear do not differ particularly from those occurring elsewhere in the body.

The early secondary rashes oftentimes involve the mastoid region, the auricle, the meatus, and even the drum-membrane. Occasionally a condyloma is seen on the auricle or in the meatus, appearing as a dull-red, warty excrescence, whose surface is either moist or dry and scaly. When the condyloma is situated in the meatus it will block the passage more or less completely and give rise to a profuse purulent discharge, and it may even bring about a general, diffuse inflammation of the meatus.

Gumma of the auricle leads at times to deep ulceration, with destruction of cartilage and resulting deformity, and superficial eruptions may give rise to shallow ulcers.

Periostitis of the meatus occurs at times in syphilis, and exostoses have been thought by some to arise from this cause; but a large percentage of those suffering from exostosis of the meatus do not have syphilis, and it is not certain that syphilis ever causes exostoses here.

Ulcerations and moist areas are to be dusted with calomel, painted with nitrate of silver solution, or covered with an emollient ointment; and granulations are to be cauterized or excised.

MIDDLE EAR.

The ordinary inflammations of the middle ear, both non-suppurative and purulent, genetically stand in close relationship with affections of the rhinopharynx, and are readily brought about by syphilitic affections of the nose and throat. Besides these secondary inflammations, primary periosteal inflammation of the middle ear may also be caused by syphilis.

There is nothing characteristic about the chronic non-suppurative inflammations of the middle ear in syphilis, ex[illegible] they prove refractory to simple treatment; and the ir[illegible] factor in their production is only to h[illegible]

by a trial of antisyphilitic treatment. In children with hereditary syphilis the rhinitis, commonly called "snuffles," is a frequent cause of middle-ear disease.

Suppurative middle-ear inflammation may lead to mastoiditis, sinus-thrombosis, meningitis, and brain abscess; and, in all these complications, as well as in the middle-ear affection itself, the existence of syphilis renders the prognosis more grave.

Chancre at the orifice of the Eustachian tube, which has been caused in many instances by the use of an infected catheter, or ulceration in this region may block the tube; while later, the resulting scars may render it unduly patent. The tubal cartilage may undergo fatty degeneration. And frequently the diffuse rhinopharyngitis of the early stages of syphilis will give rise to an obstinate chronic catarrhal otitis media that rapidly impairs the hearing.

The local **treatment** of non-suppurative inflammation of the middle ear consists in giving attention to the nose and throat, and in inflating the Eustachian tube; of suppurative inflammations, in carefully cleansing the ear, making antiseptic, astringent, or caustic applications, and in removing granulations and carious bone. In all, antisyphilitic treatment is to be employed.

INTERNAL EAR.

Affections of the internal ear are seen occasionally in acquired syphilis and very frequently in the hereditary form. Thus Hutchinson's triad of characteristic symptoms of hereditary syphilis comprised deafness, parenchymatous keratitis, and notched teeth.

Affections of the internal ear either develop in the course of middle-ear disease or they originate primarily in the internal ear, beginning abruptly with well-marked symptoms. In the latter case the patient notices tinnitus of high pitch, vertigo, and defective hearing. There may also be nausea, headache, and delirium. Hearing by bone conduction is diminished, and the perception of high tones is lost or interfered with. The subjective symptoms after a time pass off, and the hearing that remains may be preserved; but usually it gradually fails. In patients with hereditary syphilis who become deaf from labyrinthine disease the drum-membranes later usually show evidences of a simultaneous affection of the middle ear.

The pathology of syphilitic labyrinthine disease consists, first, in infiltration and swelling of the membranous tissues of the labyrinth, interfering with the function of the nervous apparatus; and, later, in actual hypertrophy of the connective tissues leading to cicatricial shrinking, with consecutive atrophy of the nervous elements.

The prognosis as regards the recovery of hearing that has once been

lost is bad. Hence in patients known to suffer from hereditary syphilis ear symptoms should be attentively looked for, and when found treated without delay.

Treatment in the acute stage consists in the application of leeches below the mastoid, the employment of general antiphlogistic measures, and the use of pilocarpine. Constitutional treatment is indicated in all stages.

CHAPTER XXXVII.

TERTIARY SYPHILIS.

WHEN syphilis does not become extinct in the secondary stage it passes into a chronic condition, called tertiary syphilis.

The evolution of tertiary syphilis, as a rule, is slow, uncertain, insidious, and unattended by local or general prodromata. While in secondary syphilis the infection very often runs an orderly course, and a general estimate may be formed as to what morbid conditions and lesions may be expected in tertiary syphilis, as a rule, there are no special criteria to govern us in our prognosis, since all is occult and without order or system. The tertiary stage has very aptly been called the *terra incognita* of syphilis.

Tertiary syphilis presents in its evolution and course many striking differences from the secondary form. Tertiary lesions, as a rule, are of deep development, of compact structure, and of slow and aphlegmasic nature. They are usually less numerous and more isolated than secondary lesions, less certain as to their seat, less regular in their course, and much more deeply seated and destructive in their tendency.

Tertiary lesions attack the subdermal and submucous connective tissues, and produce in them more or less extensive and dense infiltrations, most of which show a tendency to degeneration. While in secondary syphilis the more superficial strata of the skin and mucous membranes are involved, in the tertiary stage the whole thickness of these structures is attacked. In secondary syphilis the skin lesions are more generalized, more numerous, and are symmetrically placed. In the tertiary stage their number is restricted; they are usually irregularly distributed, and very often their arrangement is unsymmetrical. The old eruptions are localized to one region, and they may perhaps exist in several.

In secondary syphilis we not infrequently see a tendency in the lesions to undergo involution and resolution; in tertiary syphilis no tendency to spontaneous retrogression of its lesions is, as a rule, seen. While in the majority of cases of secondary syphilis the viscera are spared or are the seat only of irritative or hyperæmic processes, in tertiary syphilis they are attacked more or less deeply by a chronic progressive infiltrative process which produces nodules, plaques, and tumors called gummy tumors, or syphilomata. Thus in its far-reaching

and pathological action tertiary syphilis involves not only the superficies of the body, but also its internal parts—the viscera, the bones and their adnexa, the muscles, the bloodvessels, and the nervous system.

The pathological processes in tertiary syphilis are, in the main, similar to, but more fully developed, intense, and exuberant than, those of the secondary stage. They include, in brief, perivascular cell-changes, round-cell infiltration (gummatous infiltration and nodulation), and irritative processes which result in the development of fibrous or connective tissues (in bones, joints, muscles, tendons, synovial sheaths, and the skin and mucous membranes), and last, but not least, the excessive development of connective-tissue neuroglia in the nervous structures of the cerebrospinal axis. These processes may eventuate in the degenerative conditions already mentioned.

It is absolutely impossible to write a clear and thoroughly systematic clinical history of tertiary syphilis, since no two cases are alike, and the date of invasion, the extent, depth, course, and seat of the morbid process, and the organs or tisuess attacked, are usually different in each instance. While, therefore, no sharply and precisely drawn clinical divisions can be presented in describing tertiary syphilis, certain generalizations may be made which will tend to give a clear idea of this chaotic and discordant stage of syphilitic infection.

Tertiary syphilis in a rather small proportion of cases develops more or less precociously. In some cases as early as the second, third, or fourth month following infection, when the roseolous syphilides or the papular syphilides are still present, the condition of the patient changes for the worse. The skin lesions increase in size, ulcerate, and suppurate perhaps very profusely. The resulting ulcers increase in size and depth, and may present sloughy, even gangrenous, features. Then these lesions show a tendency to spread over the trunk, the extremities, the face, and the scalp. With these ulcerations cutaneous gummata, or more superficial but thick tubercles, may develop, soften, and lead to deep ulcers. The patient then becomes weak and cachectic. In a small proportion of these cases such nervous affections as hemiplegia, aphasia, meningeal hyperæmia, epilepsy, paralysis of the motor oculi and facial nerves, and degenerative changes in the optic and auditory nerves, may be seen. This form of tertiary syphilis in very rare instances runs an unusually rapid and severe (called by some galloping or lightning-like) course, and soon ends in death, which is due to a decidedly febrile state and marasmus. These cases sometimes present distinct features of septicæmia. In this very early form of tertiary syphilis we find multiple large and severe disseminated and generalized ulcerations, and an adynamic condition of the system, shown by the malignancy of the infection and a tendency to ulceration, gangrene, and phagedena. In

these cases the syphilitic infection seems to luxuriate exuberantly, and its action is very rapid.

Many of these cases of precocious tertiary syphilis are cured after a hard struggle by proper treatment and suitable hygiene.

Tertiary syphilis may be rather less precocious than in the form just described. Toward the end of the first year of the infection, after the evolution of secondary manifestations, some patients become weak, anæmic, and lose flesh. One, several, or many ulcers, which may arise *de novo* or follow in the wake of a secondary lesion, may appear on the scalp, the face, or the extremities, and run an active and rapid course, showing great rebelliousness to local and general treatment and careful hygiene. In some of these cases there are concomitant bone, joint, pharyngonasal, and testicular lesions. The patient is and continues to be a sick man upon whom destructive lesions appear at short intervals. In most of these cases, after a very severe ordeal, the patient gradually gains health and strength, and may be in the end cured. In these early forms of tertiary syphilis it is not uncommon to observe the onset of pulmonary tuberculosis, which usually ends fatally in a few weeks or months.

Nervous affections are of very frequent occurrence in precocious tertiary syphilis, the brain being most frequently attacked. The spinal cord is much less frequently affected.

Death from brain and spinal-cord lesions is to be feared in early tertiary syphilis. It will be generally found that precocious tertiary syphilis is much more rebellious to treatment than the late form. In many cases treatment seems to have little if any effect.

The results of the experience of many observers go to show that the onset of tertiary syphilis occurs in the third or fourth year of the infection in the majority of cases, and that from this date until the tenth or twelfth year its appearance is progressively less frequent. Tertiary syphilis may in exceptional cases develop from the twelfth to the twentieth year. After the lapse of two decades tertiary syphilis rarely occurs.

It is well to emphasize the point that the possibility of error in the diagnosis of late tertiary lesions is great, and that errors are common. It is always a good plan to be skeptical about alleged cases unless they are vouched for by an accurate and skilled observer. Many cases presenting lesions of tuberculosis, actinomycosis, mycosis fungoides, sarcomatous and epitheliomatous hyperplastic tumors, gout, rheumatism, traumatism, and iodide of potassium intoxication have been paraded as evidence of the activity of the syphilitic virus ten, twenty, thirty, forty, and fifty years after infection.

Tertiary syphilis attacks the following tissues and organs: the skin

most frequently and then in order of frequency the nervous system, the osseous system, mucous membranes, and viscera are affected.

Second to cutaneous lesions nervous disturbances are most frequent up to the twentieth year of infection, and after that date they are very rare. Syphilitic myelopathies are very rare in the late years of syphilis.

Concerning these late evolutions of tertiary syphilis, it may be said that in many cases they were preceded by other tertiary lesions more or less remotely in the majority of cases. In very exceptional cases there has been no antecedent tertiary manifestation whatever.

While it is impossible to describe sharply marked type-forms of tertiary syphilis, a generalization of cases may be made.

Cases of ulcerating tubercular syphilide are sometimes seen in which the lesions begin in the third or fourth year, sometimes earlier. I have seen some rare cases in which these syphilides invaded in persistent and interrupted outbreaks the scalp, the face, the extremities, and the trunk, producing disfigurement and perhaps mutilation in all parts attacked. Thus, the disease kept on, in spite of good treatment, for years; then, after an interval of ten years of apparent health, gummatous infiltration and ulceration occurred, and the skin became necrosed at slight traumatisms. In these cases syphilis leaves its permanent morbid impress, with a tendency to hyperplasia and ulceration of the skin, for years. In some occult way a peculiarly active vulnerability is engrafted on the tissue.

Then, again, we see cases in which resolutive tubercular syphilides appear on one region and remain limited to it for a long time, and in the course of ten or twenty years attack most of the integument of the whole body. In these cases of extensive chronic skin lesions the patients may enjoy fairly good and seemingly robust health. In some cases intercurrent nervous, visceral, osseous, and testicular affections develop. I think, however, that in general the nervous system is usually spared in these cases of extensive tegumentary invasion.

Perhaps one of the most frequent forms of tertiary syphilis is that in which the serpiginous syphilide develops upon some specific lesion or on some simple ulceration or traumatism, and travels over certain regions or the trunk or the extremities. Patients thus attacked may be thin and weakly, or even robust and well built. This lesion, to my mind, indicates rather that the skin of the patient remains vulnerable to microbic invasion than that it is an evidence of the activity of the syphilitic diathesis.

Some cases of late osseous lesions present a tolerably uniform course. Thus, we see that nodes appear on the skull and long bones, and develop in crops at irregular intervals for years. In some of these cases there is coexistent joint-lesion, and in some men testicular involvement. In

some of these bone cases there is often severe and persistent rheumatism of the muscles or fibrous tissues and a markedly cachectic condition. These patients look sallow and ill-nourished; their faces bear the stamp of suffering; they suffer from malnutrition and from insomnia the result of pain. In these cases the morbid condition is very chronic, and very rebellious to treatment.

There is a further class of cases of tertiary syphilis which present a tolerably well-defined course. The patient suffers in the secondary period with rashes and meningeal symptoms, and on their disappearance a condition of impaired health supervenes. This may last years, and then the patient may be attacked by gummata of the skin, bones, or testes, or he may develop some hyperplastic or arterial, brain, or cord affection, which may be cured, may leave him a cripple, or may kill him.

Cases are not of infrequent occurrence in which, after a faint and ephemeral or a well-developed roseolous syphilide, an interval of seemingly perfect health of a few or many years may occur, and then cutaneous, osseous, testicular, visceral, or cerebrospinal symptoms may develop.

It is not uncommon, particularly in women who have had a more or less severe attack in the secondary stage, to observe in the second and third, and even later, years of the infection the onset of cachexia and a gummatous infiltration into the hard or soft palate, which may produce much destruction of tissue. Very commonly these are the only lesions, but in some cases skin and bone gummata are found to coexist.

After this lugubrious recital of these grave and malignant morbid conditions due to tertiary syphilis, it is well to remember that in the majority of cases one or more regions and one or several organs or tissues may be attacked, and after a time, under the influence of treatment, a cure is induced.

Though tertiary syphilis is severe and often threatening in its course, fortunately for the human race it is, as a rule, amenable to treatment in a marked degree.

It is claimed by some authors that tertiary syphilis is not true syphilis, but a chronic morbid condition left behind by the active infection. Other authors think that in tertiary syphilis the tissues have undergone some changes, and, instead of reacting normally to any stimulus, they produce a peculiar growth of cells known as gumma. Seeing that tertiary lesions may coexist and follow directly in the wake of secondary manifestations, that the pathological processes of the whole disease show a distinct gradation and an intimate correlation, it is illogical to claim that syphilis can stop short and that a radically different morbid condition is then developed. Clinical observation and pathological re-

searches show very conclusively that in the early part of this infection the hyperæmia is moderately active, and that the cell-proliferations are exuberant and widely scattered. In the late stages, on the contrary, the cell-growth is slow and insidious, and shows a tendency to become localized deeply in the tissues of regions and organs.

It is hard to explain the late onset of connective-tissue proliferation in the cerebrospinal axis, in the testis, and viscera on any other ground than that a morbid predisposition or impress has been engrafted on the vessels and cells of these parts in the period of activity of the infection, and that later on, owing to some stimulation, injury, or perhaps excess of function, the new cell-growth is inaugurated.

It is claimed that in the course of tertiary syphilis the parotid, the sublingual thyroid glands, and the pancreas may be attacked. Cases of these affections have been reported, but our knowledge of them is very meagre.

Etiology.—Lengthy essays have been written on the etiology of tertiary syphilis, but the essential facts can be briefly stated. Any depraved condition of the system may cause the secondary period of syphilis to be prolonged, and to be followed by tertiary manifestations. Then, again, the tissues of some persons seem to be so profoundly affected by syphilis that the infection runs its full course in them. By far the most potent and frequent cause of tertiary syphilis is the absence or the insufficiency of treatment. This statement almost sums up the case. Marschalko, in an exhaustive study of 673 cases of tertiary syphilis, states that, as a result of good treatment, tertiarism was found in only 2.7 per cent., whereas in imperfectly treated cases it was 19.3 per cent., and under insufficient treatment it reached as large a figure as 23.9 per cent.

The Infectiousness of Tertiary Syphilis.—The secretions and tissue-detritus of precocious and quite early tertiary lesions contain infectious qualities, while those of very late lesions are probably inert. We cannot, to-day, state positively when syphilitic lesions lose the power of infecting healthy persons.

CHAPTER XXXVIII.

THE TERTIARY SYPHILIDES.

THE GUMMATOUS SYPHILIDE.

THIS syphilide is almost invariably a late lesion, and, although usually invading the skin, it always begins in the subcutaneous connective tissue. It consists of tubercular infiltrations, some as small as a pea and others several inches in diameter. When great extent of tissue is involved the lesion is usually composed of several tumors merged together.

This syphilide is particularly prone to appear in parts where the connective tissue is loose and abundant. It may be limited to the connective tissue, but on invading the skin it usually ulcerates. In the former case we apply to the syphilide the term *gummous* or *gummous tumor;* in the latter case we call it a *gummous ulcer.*

The progress of the lesion varies according to the condition of the parts upon which it is developed; in thick and copious adipose or cellular tissue the tumors may remain a long time without attacking the skin; under contrary conditions or overlying a bony surface implication of the skin is early and the bone itself may be eroded superficially or deeply. Sometimes the muscles are exposed by complete destruction of superjacent tissues. Bloodvessels, nerves, and sometimes bursæ may be involved by extension of the lesion.

We shall study this syphilide in its three stages—of tumefaction, of ulceration, and of repair. (For the description of precocious gummata, see page 561.)

In the first stage we find from one to six tumors, which appear simultaneously or in succession and run an indolent course. These small tumors are painless and attended by slight tenderness. Their growth is generally slow. At first freely movable, they soon become attached to the surrounding tissues, especially when seated over bony surfaces or in regions where connective tissue is scanty. They give to the finger a sensation of moderate firmness, retaining their shape under pressure, having neither the elasticity of a fatty tumor nor the hardness of scirrhus. In many cases they tend to invade the skin rather than the deeper tissues. Their superficial growth is first shown by slight reddening of the overlying skin, which rapidly becomes thickened and less supple. Finally, we observe a tubercular infiltration, round or oval in shape, perhaps slightly elevated, of a deep coppery-red color, and surrounded by a well-marked hyperæmic areola. (See

Fig. 145.) They may remain in this condition for many weeks, or even months, and, still under treatment, undergo resolution. Generally, however, their firm structure slowly breaks down, and finally fluctuation may be detected. In many cases the soft, yielding character of the tumor gives a false impression that pus is confined beneath the skin.

Fig. 145.

Gummatous syphilide, as yet unulcerated, elephantiasic, gummatous condition of lower leg.

The minute changes leading to this condition are of interest. The immediate product of the death of the subcutaneous neoplasm is a thick, gummy mass, the intermingled pus being supplied by the surrounding parts, which are secondarily inflamed. The destructive process goes on very slowly until after the occurrence of ulceration. The small ulcers first formed are deep and sharply cut; they extend in all directions until the destruction of the entire neoplasm results in the formation of what may be called a typical gummous ulcer. Such an ulcer is either round, oval, or gyrate from fusion of the small ones, and sharply cut as if punched out. Its floor, which is greenish-red or sometimes greenish-black, is uneven and bathed with sanious fetid pus. (See Figs. 146 and 147.)

Sometimes the integument of the face becomes infiltrated with gummatous tissue, and as a result the features are as much distorted as they are by leprosy, and have a decided leonine appearance.

Gummata not infrequently form in the female breast, less commonly in both breasts. The importance of their diagnosis is here very great; failure to recognize their true character may lead to unnecessary surgical interference. They appear, as elsewhere, slowly; they are only mode-

Fig. 146.

Gummatous syphilide.

rately hard, and are painless. There is no retraction of the nipple, and the axillary glands are unaffected. The ulceration which occurs is characteristic and quite unlike the indurated, fungoid ulceration of cancer. In all cases of limited tumors of the breast a suspicion of their gummatous character should be entertained, especially when the patient is young or of middle age. A mistake is liable to occur only when the gumma is very large and of unusual depth.

Gummata are very frequently diagnosticated as sarcomatous tumors, and many cases are on record in which they have needlessly been removed by the knife.

The cicatrices of gummous ulcers differ according to the depth of the destructive process. When the ulceration has been superficial the scars are slightly depressed, thin, parchment-like, and of a dead-white color. All such cicatrices become blanched from their centre outward.

The cicatrices of deep ulcers are much depressed, and often very uneven, owing to fibrous bands and nodules. Some are also peculiar in being adherent to the deeper parts. In case the gummous ulceration has involved the superficial portion of the bone, the cicatrix adheres as firmly as did the periosteum to the osseous surface. In other cases where much destruction of bone has occurred no cicatrix at all is formed, the eroded surface being surrounded by a firmly attached fibrous band which represents the margin of what might have been a cicatrix.

FIG. 147.

Gummatous infiltration over the wrist and dorsum of the hand.

Gummy tumors present certain peculiarities in different regions of the body, and may be complicated by intercurrent morbid processes. Erysipelas may attack the ulcers, especially when seated on the head or extremities. The œdema which accompanies gummous ulcers of the leg may be so severe and chronic as to induce a condition similar to elephantiasis Arabum.

Gummy tumors of the scalp are seldom isolated and movable; usually the entire integument is thickened, and, although at first movable over the bones, soon becomes adherent. Small ulcers form at follicular openings, and gradually increase in size. Sometimes the outer table of the skull is destroyed, and in other cases the whole thickness of bone becomes necrosed; the dura mater, however, resists the destructive

action in a remarkable manner, and is rarely involved. The scalp over the frontal and parietal bones is most commonly attacked, and not infrequently the forehead, chiefly toward the median line, is invaded.

The **course** of such ulcers varies with the care they receive. They may remain in an indolent condition for months, discharging a *foul* secretion, showing no reparative tendency, and inducing great œdema of surrounding parts.

The depth of the ulcers depends largely upon the thickness of the original infiltration. In some cases the gummy deposit is confined to the cellular tissue just below the papillary layer of the skin, and the resulting ulcer is relatively shallow. In other cases it is more deeply seated below the derma, and may be exposed by scraping off the upper layers.

Gummata may be situated in almost any region over a nerve, and may then cause pain.

The **prognosis** is influenced by the date of the appearance of the syphilide, its extent, and the general condition of the patient. Its early and malignant appearance indicates an active and severe form of syphilis, in which visceral gummata are to be feared.

The **diagnosis** is to be made in its stages of tumefaction and of ulceration. When it exists as a movable, subcutaneous tumor it may be mistaken for a fibrous, a sarcomatous, or a fatty tumor, or perhaps an enlarged ganglion. The syphilitic lesion is usually multiple, and is not compressible like the fatty tumor nor as hard as the sarcoma. Sarcomata tend to attach themselves to subjacent parts; the gummy tumors invade the skin. The history of the case, the absence of pain in the tumor, and its situation may be of assistance. Tumor-like infiltrations upon the face, in the female breast, about the genitals, near joints, and wherever connective tissue is abundant should always, in case of doubt, be subjected to specific treatment.

The general appearance, situation, and history of gummatous ulcers are generally sufficient to establish their character; but sometimes, especially on the face and lower extremities, they may be confounded with ulcerating lupus or with simple eczematous or varicose ulcers.

Subcutaneous nodular infiltrations which resemble in nearly all their features gummata are sometimes seen, particularly in weakly and so-called strumous subjects. These nodules, called *erythemé induré des scrofuleux*, and *gommes scrofuleuses*, may be of the size of a pea or of a hazelnut or walnut, and they may exist in the form of diffuse plaques. They run a chronic course, they contract adhesions with the skin, and they may lead to ulceration. In all particulars these lesions as to physical appearances, site of development, and course resemble syphilitic gummata. They occur most frequently in young subjects, and

rather rarely in older persons. In some of these cases antisyphilitic treatment proves beneficial even when a history of syphilis cannot be obtained.

Treatment.—In all cases a vigorous mixed treatment should be persisted in. When ulceration is active it may be necessary in some cases to scrape away its base and margin. The necrotic membrane so commonly seen in these ulcers should be treated with gauze compresses of sublimate solution (1 : 2000 to 1 : 500), or with compresses of carbolic-acid solution (5 per cent.). The application of carbolic acid or nitric acid may be necessary every few days to remove necrotic matter. When the slough or membrane on the surface of the sore is not very dense or adherent, iodoform may be dusted upon it. When a raw surface has been exposed the application of a mild mercurial ointment with the addition of balsam of Peru (1 drachm to the ounce) will usually cause prompt healing.

THE TUBERCULAR SYPHILIDE.

This syphilide consists of deeply seated, circumscribed infiltrations into the skin, resembling in appearance the large, flat, papular syphilide, and being, in reality, nothing more than an exaggerated form of the latter lesion. The whole thickness of the skin is involved, whereas in the papular syphilide the deeper layers escape; the latter is a secondary manifestation, while the tubercular syphilide is a tertiary lesion.

The tubercular syphilide seldom ulcerates, but disappears by interstitial absorption; hence it has been called *non-ulcerative* or *resolutive.*

The resolutive tubercular syphilide may appear even before the second year of syphilis; it is usually developed between the third and sixth years, but may be seen as late as the eighth or tenth year, and, according to some authors, even as late as the fifteenth or twentieth. It is usually met with in cases that have not been thoroughly treated at the outset. Its course is very chronic and marked by numerous relapses.

The tubercles begin as deep-red spots, which slowly increase in size and thickness until, when fully developed, they have a diameter of from half an inch to an inch. Sometimes they are as small as a split pea, and again they are more than an inch in diameter. Their surface is flat or rounded, and their borders are sharply defined. The smaller lesions are more elevated and rounded than the larger. The color of the tubercles is at first dark red, with possibly a tinge of crimson, but frequently it is of a light pinkish red. Their surface is usually smooth and free from scales. Where the epidermis is thick proliferation is occasionally free, giving the tubercles somewhat the appearance of psoriasis.

The tubercles first appear on the forehead or back of the neck near the scapulæ. They may be limited to these regions or may invade the trunk, always more copiously on the back and over the gluteal regions. In front they are generally scattered, but in some cases they occur in large numbers over the sternal region, on the borders of the axillæ, and over the deltoid muscle. They are more numerous on the outer aspects of the extremities near the joints than on the inner.

The **course** of the eruption is very slow; several weeks, or even months and years, may pass before the entire body is covered. When the eruption is general the tubercles are usually disseminated without order, rarely showing a tendency to circular distribution. Successive crops fill the interspaces between those first developed. When precocious the eruption may be very copious. In several of the cases I have seen of recurrence of this eruption the tubercles were almost in contact with each other. Such cases are rare, and belong to the group of malignant precocious syphilides.

These tubercles are prone to appear in an irregularly triangular group, with the apex at the glabella and the base near the margin of the scalp. They may form a sort of corona in the latter regions with sometimes a number on the scalp itself. On the face they sometimes run together and form patches. Again, several tubercles on the nose blend and extend to the cheeks, forming a butterfly-shaped patch. When the tubercles spread in a rapid manner a distinctly elevated margin or rim is formed, the enclosed patch being depressed. In this serpiginous form the whole face may become invaded. The centre of the patch gradually loses its color and becomes thinner, until in severe cases a cicatricial tissue is left. This process is usually rapid, and then slight destruction of the skin results; when it is slow more or less atrophy of the skin is produced. This may be called the annular tubercular syphilide. (See Plate XXXVIII.)

These tubercular rings are not seen in all cases; in some the lesion extends merely at certain portions of its margin. Thus, kidney-shaped growths are produced, or new tubercles may form and finally coalesce around the entire periphery of the patch. Tubercular patches seated on non-hairy parts are smooth, while those developed in regions supplied with hair are often uneven and warty. The latter condition is due to fusion of the tubercles and excessive prominence of the follicles and papillæ. Their surface may be covered with a crust of serum and epidermis, or the scanty pus may dry between the numerous elevations. Cases of invasion of the entire scalp in this way have been recorded, and doubtless many of the cases of framboesia of the old writers were aggravated instances of this vegetating or papillomatous tubercular syphilide. The papular syphilide may undergo a similar metamor-

PLATE XXXVIII.

THE ANNULAR TUBERCULAR SYPHILIDE.

phosis. We have, therefore, two kinds of vegetating or papillomatous syphilide—a papular and a tubercular—which differ merely in degree. The head and face are most commonly attacked, but the trunk about the shoulders, over the sternum, and in the inguinal and gluteal regions may be invaded. When this syphilide is thus altered in character its course is more chronic than usual. The papillomatous or vegetating appearance of this form of tubercular syphilide is due to the exuberant

Fig. 148.

The late variety of the vegetating syphilide, showing its annular form and its serpiginous tendency.

new cell-growth in the papillæ, which become greatly hypertrophied. (See Figs. 148 and 149.)

The **course** of the eruption depends largely upon treatment. In its early stages it will usually be dispersed by vigorous measures. A limited relapse is very likely to occur in case of inadequate treatment.

The **prognosis** of this syphilide is good, although it indicates an active and persistent form of syphilis.

Diagnosis.—This syphilide is to be diagnosed from lupus vulgaris, elephantiasis Græcorum, carcinoma, and psoriasis. Lupus generally begins in early life, and is never so diffusely scattered as the tubercular

syphilide. The resemblance is seldom striking except when the latter is limited to the face. Lupus-tubercles are usually more irregular in outline and deeper than those of syphilis. They are pinkish-red rather than brownish-red, as in the latter disease.

FIG. 149.

Vegetating syphilide of dorsum of foot.

In some cases of true leprosy tubercles occur which resemble in size, shape, and color those of syphilis, but they are usually accompanied by white, anæsthetic patches, large spots of brown pigmentation, nerve-swellings with perverted sensations, large nodular infiltrations and ulcerations, or other manifestations which characterize leprosy.

Although superficial carcinomatous tubercles may resemble those of syphilis, they are never so scattered, and are always much larger, sometimes involving an entire region.

The tubercular syphilide occasionally presents two appearances which resemble psoriasis. The first is when the tubercles are covered with an unusual number of scales, especially on the outer aspect of the arms, where psoriasis is prone to appear. The second is when the tubercles undergo involution and form rings. Psoriasis, however, is a disease beginning in youth, and is essentially scaly. The tubercles of syphilis are infiltrations, and, though some may be covered with scales, others will be found free from them. In syphilis, again, we have the history of the case and perhaps other manifestations of the disease. In rare cases in which the eruption is limited and the history obscure mercurial treatment settles all questions, since it cures a syphilide and does not influence psoriasis.

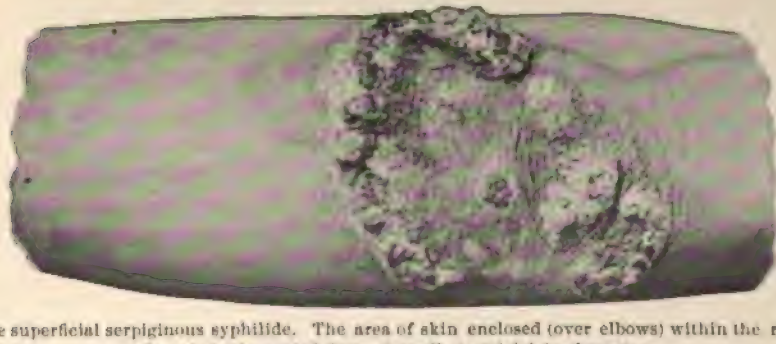
Treatment.—Inunctions of mercurial ointment should be regularly administered and iodide of potassium in good-sized doses should be taken internally. The mixed treatment is also very beneficial. Mercurial fumigations are often of surprising benefit in causing the prompt involution of this syphilide.

THE SERPIGINOUS SYPHILIDE.

This syphilide creeps over large surfaces by ulcerating at the periphery of patches while it heals in the centre. It may occur as early as the second or as late as the tenth or fifteenth year of syphilis, possibly later. Its course is very chronic, and, although unattended by pain, it frequently causes great inconvenience. Its effects on the skin may be slight or it may leave disfiguring cicatrices. There are two varieties of this lesion, a superficial and a deep.

The *superficial serpiginous syphilide* begins as a pustule, generally of the impetigoform or of the variolaform syphilide. In its early stage it consists of a superficial ulceration, which has no characteristic features indicative of its future course, but which extends in the shape of a round or oval patch. If treatment, and particularly local treatment, is not employed, the process continues and crusts form until the patch reaches a diameter of about two inches; granulations then spring up from the centre, and the crust falls off except at the periphery, where it adheres as an encircling ring. Thus is formed a ring of crusts enclosing a more or less hyperæmic area of a round or oval shape. (See Fig. 150.) The color of the crusts is usually yellowish-brown or greenish-black, and their thickness about one-third of an inch. The underlying surface is smooth, of a grayish-red color, and ulcerated at the margins. Around the edges is a narrow red areola. The ulcerative process slowly progresses at the margins of the patch, a rim of

Fig. 150.



The superficial serpiginous syphilide. The area of skin enclosed (over elbows) within the rings of crusts is pigmented, but not at all cicatricial in character.

crust at the same time forming. Healing of the enclosed surface keeps pace with the peripheral extension of the ulceration, so that the width of the crust, varying from half an inch to an inch, is steadily maintained. The centre of this surface is blanched; its margins are red, and they merge gradually into the ulceration. This process may continue many years and involve extensive surfaces. When healing

begins the crusts become harder and darker, and the redness of the central patch and of the areola diminishes.

The *deep serpiginous syphilide* has for its focus of ulceration one of the late or tertiary lesions, such as a tubercle, an ecthymaform pustule, an ulcerating gumma, or some traumatism. Whatever the starting-point, there is soon developed a deep, sharply cut ulcer with undermined edges and a coextensive crust. This ulcer slowly or rapidly increases in size until it attains a diameter of two or three inches, when changes similar to those observed in the superficial variety may occur. The crust becomes thin at its centre and thick at its margin; the thin portion soon falls off, leaving a round, deep-red cicatrix, surrounded by a thick, greenish-black crust less than an inch in width. When this syphilide is fully developed and has attained a diameter of from four to six inches, its appearances are more marked. (See Fig. 151.) In the centre is a round or oval patch of cicatricial tissue having a coppery-red color, and firmly attached to the subcutaneous connective tissue. This is completely enclosed by a ring of crust which grows

Fig. 151.

The deep serpiginous syphilide, showing much cicatrization of the abdominal wall.

steadily outward and may become very large. The enclosed cicatricial area keeps pace in size with the increase of the encrusted ring.

Relapses may occur from ulceration of the cicatrix.

The **course** of this syphilide is always slow, often occupying many years. In some cases it is accompanied by profound cachexia, while in others there is no disturbance of the general health.

This syphilide is of rare occurrence. It may appear as early as the third year, but generally later, even up to the fifteenth year after infection. It appears usually on the inner surface of the forearms and arms, on the breast, and on the legs. It causes little if any pain, but frequently gives great annoyance when near the joints.

The **prognosis** of this syphilide depends entirely upon the institution of general and local treatment which, aided by tonics and good hygiene, will produce a prompt cure.

The **diagnosis** from serpiginous lupus and serpiginous chancroid is seldom difficult. Lupus usually begins in early life, and attacks the face. Its ulcerations are less definite and sharply cut than those of the syphilide. In lupus red tubercles of ulceration, covered with crusts of light-yellow or bluish-brown, are mingled with the cicatrices, which are always uneven and fibrous. The history of the case may add to the certainty of diagnosis.

A serpiginous chancroid usually has such a clear history that no mistake can occur.

Treatment.—The crusts must be removed by means of hot bichloride compresses. The ulcers should be well cauterized with pure carbolic acid, after which bichloride gauze may be used for a time. Then the parts are to be covered with mercurial ointment. Internally the mixed treatment should be given.

RUPIA, OR THE RUPIAL SYPHILIDE.

This name, derived from the Greek *ῥύπος*, dirt, is applied to an eruption composed of ulcers surmounted by laminated crusts. It appears sometimes precociously during the first year of syphilis, but it belongs among the late lesions. It usually indicates intense syphilitic infection, and is often accompanied by fever. It has never been seen in hereditary syphilis. Although a pustulo crustaceous eruption, it partakes of the nature of tertiary lesions in the deep-seated infiltration always present beneath the crusts.

Rupia may be divided into two varieties: one, in which the crusts are small, numerous, and generally scattered; another, in which they are large, less numerous, and more localized. All of the lesions of rupia begin as a red spot, which soon becomes a flat pustule which dries into a greenish-brown crust. Subsequent changes are very slow. The initial crust is usually small, and underneath it is a superficially ulcerated, infiltrated surface. The infiltration and ulceration extend somewhat beyond the original crust, and another layer of crust is formed

beneath it by the secretion from the ulcerated surface. Thus several distinct but adherent laminations are formed as the ulcer increases in size, each succeeding one being larger than its predecessor. This result is mainly due to the fact that the pus is thick, and that it is secreted slowly and dries quickly. The process may continue until the crusts attain a diameter of half an inch or even two inches. (See Fig. 152.) In rare cases they have been seen with a diameter of fully six inches. When developed the rupial crust is conical, distinctly laminated, and of a brownish-black color tinged with green, similar to a dirty oyster-shell. The crust is hard, firm, and adherent, although its layers are often perfectly distinct. Underneath there is an unhealthy, grayish-red, ulcerated surface bathed in thick, ichorous pus and surrounded by a slightly undermined margin. The depth of this ulcer is rarely so great as that of the severe ecthymaform syphilide. It generally involves about one-half the thickness of the derma. Around each ulcer is a coppery-red areola, which merges into healthy tissue.

Fig. 152.

Rupia, or rupial syphilide.

The small rupial eruption begins either about the face or on the inner and outer surfaces of the forearms. It may then invade the trunk and lower extremities.

The eruption, composed of large crustaceous ulcers, usually presents a limited number of lesions. Exceptionally we find only one crust, but in some cases as many as twenty or thirty. They resemble those of the small variety. Under proper treatment the ulcer slowly heals, until a deep-red glazed infiltration is left, which gradually becomes thinner and lighter-colored, and, finally, a white, shining surface is left, which is

depressed below the general level, and around which a rim of brown pigment remains for months, corresponding to the former areola.

The **prognosis** of rupia is to be guardedly given. In some rare cases of precocious evolution this eruption becomes general, the lesions being large and numerous, and the general condition being at the same time much depressed. Without careful and vigorous treatment this malignant form of syphilis may be fatal. The small generalized form of rupia, although accompanied by cachexia, may be cured in a few weeks. The ulcers usually occasion much annoyance and suffering.

The large form of rupia is of considerable gravity and calls for energetic local and constitutional treatment. Although many cases recover, death sometimes occurs.

A question of **diagnosis** is not liable to arise, since no simple eruption resembles rupia.

Treatment.—This syphilide should be treated after the manner laid down for the serpiginous syphilide. It is very important that the nutrition of the patient should be carefully looked after.

THE BULLOUS SYPHILIDE.

Much confusion has been introduced into syphilography by the latitude given to the term "pustule." From the fact that some forms of syphilitic pustules are not situated upon an elevated base and are large and globular, with a tendency to run together, the existence of a true pemphigoid syphilide has been asserted. Further study has proved these lesions to be pustular, and not bullous, yet in some cases true bullæ are developed on syphilitic patients.

The eruption begins like ordinary pemphigus by an effusion of serum beneath the epidermis, which slowly increases, until at the end of a week or two a bulla the size of a pea is formed. The serum soon becomes milky, and is finally converted into a thick yellow pus. The bullæ vary in size, some being as large as a walnut. They are surrounded by a dull-red areola, which on the legs may be due to effusion of blood. The pus soon dries into a dark, greenish-black, adherent crust.

This eruption occurs mostly on the forearms and legs, where it may be aggregated. When it invades the trunk it is more extensive about the chest, but is generally discrete. Its invasion is usually very slow. Its course is also very chronic and unattended by marked symptoms, except soreness and sometimes heat in the bullæ and ulcers. New bullæ may form during the course of the eruption or after it has once disappeared.

The bullous syphilide is almost always a late eruption.

Prognosis.—This syphilide usually occurs in debilitated subjects, therefore the cure may be delayed.

The **treatment** is similar to that of the serpiginous syphilide.

CHAPTER XXXIX.

SYPHILITIC AFFECTIONS OF THE TONGUE, THE SOFT PALATE, THE PHARYNX, THE LARYNX, AND THE ŒSOPHAGUS.

THE TONGUE.

In late secondary and in tertiary syphilis the tongue may be the seat of sclerosis and of gummata.

Sclerosis.

Sclerosis of the tongue is most frequent about the fifth year of syphilis. It is usually developed near the median line, and always on the upper surface of the tongue, and may be *superficial* or *deep*.

Superficial sclerosis involves the mucous membrane only, and produces a lamellated induration analogous to the "parchment" induration of the chancre. It may be circumscribed or diffuse, and ulcerates only as a result of injury by the teeth, tobacco, or similar irritants.

Parenchymatous or *deep* sclerosis may be considered an aggravated form of the superficial lesion, and invades the muscular as well as the mucous tissue. The tongue may be greatly increased in size, but after long persistence of the lesion the newly formed fibrous tissue retracts, and, as in cirrhosis of other organs, atrophy results. At first the hypertrophied tongue receives the imprint of the teeth at its margin, the body of the organ being lobulated in a manner almost pathognomonic. The lobules are separated by furrows which cannot be effaced by stretching, in this respect offering a contrast with the rugæ which occur on the tongue in dyspepsia and other depraved conditions of the system. The induration is deep and cartilaginous, and the mucous membrane becomes changed in color and perfectly smooth. Ulceration may result from causes similar to those which produce it in the milder form of sclerosis. When parenchymatous sclerosis involves the whole tongue—which, fortunately, it seldom does—the tumefaction may be enormous. (See Plate XXXIX.)

Gummata.

Like scleroses, gummata, which are later lesions, may be designated as *superficial* or *parenchymatous*, since they may be found in the mucous or the muscular tissue of the tongue.

The *superficial* or *mucous* gumma begins as a small nodule, which

PLATE XXXIX.

PARENCHYMATOUS SCLEROSIS OF THE TONGUE.

soon softens and ulcerates, leaving an excavation with perpendicular margins and an infiltrated base, which is often covered by tenacious false membrane of a yellowish-white color.

Parenchymatous gummata are developed in the muscular tissue of the tongue, taking their origin in the connective tissue. They begin as small tumors, which are sometimes difficult of detection on account of their depth and of the surrounding induration. The process of degeneration extends from the middle of the tumors until the thinned mucous membrane over them on the upper surface of the tongue becomes ruptured, exposing a deep cavity with overhanging and sloughy walls, surrounded by an areola of induration. In view of the great size of the cavity, one would expect excessive deformity, but cicatrization often takes place with relatively slight permanent damage. In rare cases two or more gummatous tumors coalesce, and lead to enormous enlargement of the tongue and proportionate destruction of its tissue. The ulcers may be attacked by phagedena, when the condition becomes more severe. Without treatment these ulcers are remarkably chronic. One has been reported which persisted, with comparatively little change, for twenty years. Gummatous tumors occasionally undergo calcific degeneration.

Their insidious formation, their seat at the sides and toward the tip of the tongue, their chronic course, and their freedom generally from spontaneous pain are characteristic features of gummatous tumors. The observation of Anger, that lancinating pain shooting toward the ear is diagnostic of cancer of the tongue, has been repeatedly confirmed. Gummatous tumors may appear at a period much earlier than is usual with cancerous nodules. A gumma begins as a nodule which breaks down; epithelioma, as a firm, a warty, or an exuberant growth. In addition to these facts, and to the individual and family antecedents of a patient, the ulcerating surfaces of the tumors present somewhat constant features which may assist in the diagnosis.

Gummatous ulcers are usually multiple and bilateral, and are always upon the upper surface of the tongue; cancerous ulcers are usually single, and may occupy its under surface. The ulcerative process of gummata destroys the tumor; carcinomata present an ulcerating tumor, the induration of which extends with the eroding process. The floor of a gummatous ulcer is sometimes sloughy and is slightly vascular; that of a cancerous ulcer bleeds readily, and at an advanced stage secretes an ichorous pus. Zeissl gives diagnostic importance to the fact that "sebum-like plugs" may be pressed from the mucous membrane in epithelioma of the tongue.

Interference with the functions of the tongue is much less in gummata than in cancer. Ganglionic enlargement is rare in syphilitic lesions

of the tongue, with the exception of the chancre, while in cancer it always occurs.

Confirmatory evidence may be furnished by microscopic examination of the tumor and by the effect of antisyphilitic treatment, which in cancer is sometimes evidently harmful.

The **diagnosis** between syphilis and tuberculosis of the tongue is sometimes difficult, especially in those cases where the two diseases coexist, and in rare instances where tubercular deposit takes place in the tongue prior to the development of pulmonary symptoms.

In all cases of hyperplastic growth on or in the tongue the suspicion of syphilis should be entertained, and a tentative active medication should be instituted.

Atrophy of the Tongue.

Cases of atrophy and hemiatrophy of the tongue in old syphilitics have been reported, but more precise knowledge is required before we can assert that syphilis is the essential cause of these affections.

GUMMATOUS INFILTRATION INTO THE SOFT PALATE.

There are few syphilitic lesions which develop so insidiously and produce such almost irreparable injury as gummatous infiltration of the soft palate.

Early **symptoms** are insignificant or entirely wanting. Possibly the patient notices a slight uneasy or tickling sensation in the fauces, and experiences some difficulty in deglutition, which he attributes to an ordinary cold; he may even find when attempting to swallow liquids that they regurgitate through the nostrils, but this he regards as accidental. Suddenly, however, and without further warning, he is nearly deprived of the power of speech and deglutition. His voice is transformed to an almost unintelligible nasal whisper, and upon attempting to eat, solids, and especially liquids, are returned through the nose.

If we are so fortunate as to observe this affection in its earliest stage, we find that it has two modes of commencing:

First. A deposit of gummy material may take place in a circumscribed mass within the substance of the soft palate and between its buccal and nasal surfaces. This mode of origin is the one usually described by authors. The deposit then appears as a flattened tumor, of the size of a bean or almond, encroaching upon the cavity of the mouth. It is at first hard to the touch, but subsequently, when secondary degeneration has taken place, soft and fluctuating.

Second. In other cases the infiltration is diffuse. No tumor exists, but the velum is generally thickened, its mucous membrane reddened,

and its mobility impaired, as is evident when the patient attempts to articulate or to swallow.

Rupture of the abscess or ulceration of the infiltration tissues may involve both mucous surfaces or only one; in the latter case it is usually the buccal: a cavity with sharply cut and ulcerated edges is then visible in the soft palate, while possibly the voice and the power of swallowing remain unimpaired. The destructive process, however, may proceed with great rapidity, and complete perforation may soon follow. The perforation may be limited in extent, but frequently a large portion or the whole of the velum is destroyed, together with the uvula and the pillars of the fauces, and thus an immense door of communication is opened between the mouth and nose. It is thus easy to account for the indistinct and nasal voice—or "duck's voice," as the French call it—of such patients, and also for the reflux of liquids and even solids, and yet the absence of pain which characterized the onset of the disease is still a remarkable feature, since deglutition, although so difficult, is attended with a merely trifling sensation of discomfort. In addition, there is often dulness of hearing, due, doubtless, to œdema of the tissues composing the walls of the pharynx and surrounding the orifices of the Eustachian tubes.

In time amelioration of these symptoms occurs. What remains of the velum recovers in a measure its pliability and renews its function. Practice also assists in teaching the patient how to avoid regurgitation of solids and even fluids. Some improvement also takes place in the voice, and this may be greatly increased by wearing a proper plate made of hard rubber or gold. The impairment of hearing is only temporary.

It remains to speak of a remarkable sequel of this affection—viz., the change which usually takes place in the fauces as a consequence of the process of repair. Directly after the lesion has occurred the remains of the soft palate are dependent, and the opening communicating between the mouth and nares is very large. One would naturally suppose that this condition would continue, or would be aggravated at a subsequent period after cicatrization had taken place. Strange to say, such is not the course of events. The dependent remains of the palate become elevated, the ulcerated edges contract adhesion with the ulcerated walls of the pharynx, and the opening, which at first was very large, gradually contracts, until finally complete atresia is the result, or, more frequently, a diminutive channel of communication remains between the buccal and nasal cavities, less in diameter than the normal opening.

Cases not infrequently occur in which the surgeon may hesitate to express an opinion as to the cause of ulceration and perforation of the soft palate. Two causes only are likely to produce this result: syphilis and tuberculosis, and the former far more frequently than the latter.

If the patient presenting this lesion be an adult who has enjoyed at least tolerable health until the present attack, there can be little doubt that the cause is syphilis, no matter if a syphilitic history is obscure or even denied. Admitting the honesty of the patient, the primary and secondary symptoms may have been overlooked or forgotten and have left no traces.

Tertiary lesions often appear years after the secondary stage, and when least expected. Then, too, they are isolated, without concomitant symptoms to assist the diagnosis.

The **diagnosis** rests between syphilis and tuberculosis, with the chances in favor of the former. The history of the patient should be minutely inquired into, and the eyes, the nose, and the teeth should be carefully examined to determine whether they were ever affected with syphilis.

In all cases the effect of medication is a valuable aid to diagnosis. Syphilitic ulceration usually yields to full doses of iodide of potassium and mercury. Tuberculous ulceration may be benefited by the same remedies, especially if combined with tonics, but no such marked improvement is observed within a few days.

THE PHARYNX.

Lesions similar to those occurring in the mouth are met with in the pharynx. Erythema, superficial ulcers, and deep ulcerations resulting from degeneration of gummatous deposit may be observed. The occurrence of mucous patches in the pharynx has been noted by several authorities, but they are not common. Frequently ulcers extend into the pharynx from the posterior nares.

The **symptoms** of pharyngeal syphilis are usually insignificant, except in the case of ulcers, when there may be pain, aggravated in the act of swallowing and especially on the ingestion of acrid or irritating substances. The posterior portion of the lateral walls of the pharynx is more often attacked than the posterior wall. Gummy tumors have been observed on the vault of the pharynx and on the upper part of its posterior wall. After destroying the mucous membrane the disease may invade the vertebræ and produce necrosis or inflammation of the contents of the vertebral canal.

Syphilitic ulcerations of the pharynx are of special interest on account of the traces which they leave in the form of cicatrices or of adhesions, which diminish the capacity of the cavity and interfere with its functions. The cicatrices seen upon the pharyngeal wall are characteristic. They may present a stellate appearance or may assume the form of prominent bands. The cicatricial tissue is white and glistening, and may persist indefinitely or gradually contract.

In rare cases the entire soft palate is destroyed by ulceration; necrosis of the hard palate occurs, and the mouth, the nose, and the pharynx are converted into one enormous cavity. In milder cases, when the ulcerative process is limited to the border of the velum and pharyngeal wall, adhesions may form, which divide the cavity of the pharynx into two distinct chambers, one communicating with the posterior nares and the other with the mouth. There may be a very narrow passage between these two cavities, or they may be completely shut off from each other, respiration being carried on exclusively through the mouth.

Diagnosis.—It is often very difficult to distinguish between the deep ulcerations of syphilis and those of tuberculosis. There are at least four points to be considered in making a diagnosis. In syphilis other lesions are usually found. Syphilitic ulcerations follow the formation of a gummatous tumor; in but few cases, however, on account of the very slight inconvenience occasioned by even extensive lesions, is the patient observed before complete destruction of the original gummy tumor. Specific ulcers usually progress more rapidly than tubercular ulcers, and generally they yield to specific treatment. Some observers claim that the ulcers themselves present distinctive characteristics, but this is rarely the case.

AFFECTIONS OF THE LARYNX.

In tertiary syphilis the larynx may be attacked by chronic inflammation, by deep ulcerations, and by gummy tumors. As secondary results of these processes perichondritis and caries and necroses may be developed.

Chronic Inflammation.

Chronic inflammation of the larynx is an intermediate lesion; it may follow an early catarrh, or may not appear until three or four years after infection. The affection is very persistent, and commonly leads to thickening or *hypertrophy* of the mucous membrane. The thickening of the cords may be so great as to require operative interference for the relief of the dyspnœa. A remarkable instance of this condition has been reported, in which tracheotomy was done four times during a period of five years. Associated with this condition chronic ulcers are almost always found. These ulcers have ragged and thickened edges; frequently vegetations spring from them which may reach a considerable size, even to the degree of producing aphonia and of impeding respiration. The vocal cords, which are thickened and rough, are very often the seat of these ulcers. The ventricular bands may be so swollen as to overlap the cords. The vegetations which may grow from the margins of an ulcer or from other portions of the mucous membrane are often difficult to

distinguish from simple polypoid growths. Their favorite seat is at the insertion of the inferior vocal cords.

Deep Ulcerations.

Deep ulcerations occurring in the later stages of syphilis may form by extension from the pharynx or by degeneration of gummatous deposit. The epiglottis may be entirely destroyed by the ulcerative process. Next in order of frequency the aryteno-epiglottic ligaments are attacked, then the superior vocal cords, and more rarely the true cords. The ulcerations, especially those of gummy tumors, are very irregular and indurated. Extensive regions may be destroyed in a chronic and insidious manner, irreparable injury being done. These ulcerations can hardly be confounded with those of tubercular origin, which are smaller, more numerous, and more superficial. The lardaceous base and the general appearance of the lesions, in connection with cicatrices of previous ulceration, suggest their specific character. They are much more likely to be mistaken for malignant disease. In cancer the tonsils and the submaxillary glands are at an early period the seat of infiltration. Pain, often extreme, is distinctive of cancer, while the syphilitic lesion makes much slower progress, and is generally painless until the tissues have been extensively destroyed. In most cases of syphilis, moreover, there is a clear history of infection, and traces of former lesions may be discovered in the mouth or pharynx or in other regions of the body.

Gummy Tumors.

Gummy tumors of the larynx are much more common than has been supposed. The lesion is often single, and may attain a very large size; frequently the tumors are small and multiple, and may be limited to the mucous and submucous tissues. The deposit sometimes undergoes absorption, but more frequently it degenerates, forming the deep, ragged ulcers already described, which may involve the framework of the larynx and produce permanent deformity. The epiglottis and the arytenoids are most often involved, but any of the laryngeal cartilages may suffer. A fatal termination may ensue in the course of these lesions from impediment to respiration, due to the size of the tumor or to an acute œdema of the larynx.

Perichondritis.

Perichondritis is generally the result of the extension of an inflammatory or ulcerative process from the mucous and submucous tissues. The cartilage itself may be involved. Pain of a marked character is a common symptom of this lesion, and the parts are sensitive to

external pressure. Œdema of the soft parts, and deformity from the structural changes in the affected cartilage, are frequently observed. The epiglottis and the arytenoid cartilages are most often involved, more rarely the cricoid. They may be entirely destroyed.

Caries.

Caries, or true *necrosis*, in cases where ossification of the cartilage has taken place, is a common sequel of the invasion of the perichondrium by inflammation or gummatous ulceration. It is always a very late lesion, and frequently induces structural changes in the larynx which cannot be remedied.

THE ŒSOPHAGUS.

The œsophagus is very rarely attacked in the tertiary stage of syphilis, and no cases are on record in which it was the seat of morbid change in the secondary stage.

This affection begins in submucous gummatous infiltrations, runs a chronic course, and leads either to ulceration or absorption, stricture inevitably resulting in either case. If the case is seen early, active antisyphilitic treatment may bring about resolution. When cicatricial stenosis has developed, internal treatment will be of no use, and gradual dilatation, if possible, should be tried. In extreme cases gastrostomy may be necessary.

All cases of stricture of the œsophagus arise from the use of caustics, from syphilis, or from cancer.

Traumatism being excluded, the diagnosis rests between syphilis and cancer.

It is always well to give the patient a thorough tentative course of antisyphilitic treatment. It is well to remember that in cases of syphilis of the œsophagus epithelioma is liable to attack the specific neoplasm or its sequelæ.

CHAPTER XL.

SYPHILITIC AFFECTIONS OF THE TRACHEA, BRONCHI, LUNGS, AND HEART.

THE trachea, bronchi, lungs, and heart may be the seat of morbid changes in tertiary syphilis. The trachea alone may be attacked; in some patients the bronchi are involved; and in rare cases the trachea, bronchi, and lungs are affected.

These affections are not common, and we are not to-day in possession of sufficient knowledge to allow us to give a full description of the clinical history.

Undoubtedly some cases of late syphilitic changes in these parts are diagnosticated as of cancerous origin, and in many their syphilitic nature is only ascertained after death.

TRACHEA.

The lesions in tertiary syphilis of the trachea are gummatous infiltration and dense connective-tissue proliferation. As a result of these conditions ulceration, cicatrization, and stenosis follow.

The most prominent symptoms of tracheal stenosis are—1. Dyspnœa, most marked during inspiration, and especially so on any exertion of the patient. This, though a most prominent symptom, may occasionally be absent, though the obstruction to the entrance of air into the lungs may be very great. 2. A hoarse, weak, or croupy voice, even if the larynx be free from disease, due to the weak air-current. 3. Swelling of the jugulars with every expiration, due to the abnormally increased pressure in the large veins within the thorax during expiration. 4. Slight downward movement of the larynx with every inspiration. This movement is much more considerable in stenosis of the larynx. 5. The patient breathes easier with his chin depressed, as this causes relaxation and dilatation of the trachea. In laryngeal stenosis, on the other hand, the head is thrown back to facilitate the breathing. 6. Retraction of the lower part of chest with every inspiration. 7. Loud inspiratory stridor, heard best over the sternum, occasionally accompanied by a thrill to be distinctly felt over the place of constriction. Auscultation of the lungs reveals weak breathing and loud rhonchi, unless there be some lung complication. It often happens that the stricture is at the bifurcation of the trachea, and extends to one bronchus rather than to both. In such cases we have the characteristic symptoms

of stricture of a bronchus (diminished fremitus, diminished breathing, and more marked inspiratory retraction of the ribs) on that side. In spite of these definite symptoms, the diagnosis between syphilitic stricture of, and pressure on, the trachea is sometimes a matter of great difficulty.

BRONCHI.

The bronchi are similarly, and often synchronously, affected by the same processes which attack the trachea. There are many more or less satisfactorily reported cases of late syphilitic disease of the bronchi, in all of which stricture is the prominent feature.

THE LUNGS.

Our knowledge of the pathological anatomy of syphilitic processes in the lungs is far in advance of that of its symptomatology and clinical history. The truth is, that we have not yet such criteria as will enable us to distinguish sharply in the living subject the differences between pulmonary tuberculosis and syphilitic infiltration into the lungs. Many mild cases of localized lung disease in syphilitics are seen which get well under specific treatment, and from these very important cases we can derive no anatomico-pathological facts which will show us just what has taken place. Then, again, in many cases of syphilitic infection the resulting lung trouble is complicated by essential tubercular lesions, and this symbiosis makes our clinical studies uncertain or of no value.

The morbid processes of syphilis in the lungs occur in the form of indurations and gummata. Syphilitic sclerosis differs from tuberculous induration of the lung in many ways. It is met with, as a rule, in the lower or middle lobes rather than at the apices, and in the form of bands and fibrous tracts which are not welded together into a compact mass, but may enclose islets of lung-tissue, generally more or less emphysematous. The fibrous tissue is not pigmented. The bronchi in relation with these indurations are often flattened, and the alveoli are filled with exudative fluid containing leucocytes and desquamated endothelial cells. The pleura is often thickened and adherent about such diseased areas, and the surface of the lung is puckered and furrowed in much the same manner as the surface of a cirrhosed liver. Syphilis and tubercle may be combined in the same organ, but the appearance of the sclerosed tissue is distinct in each. Cavities and the presence of fresh tubercle in other parts will aid the diagnosis. It is probable that many cases of chronic tuberculous disease have been classed in literature as syphilitic. Chronic pneumonia gives a firm, compact, indurated mass, soft and glossy to the feel, and not puckered on the surface. Leprosy of the lung is very rarely seen, and

the characteristic bacilli would serve to distinguish it. Gumma of the lung is met with rather more frequently than syphilitic induration, but is still very uncommon, and no case should be accepted as such without absolute proof. Fatty degeneration takes place in the centre of the mass, but the remains of alveolar walls and flattened epithelium can often be recognized. The parts around may be thickened by proliferation of lymphoid cells and congestion, and around the whole mass, which is indicated under the term "gumma," there is always a zone of indurated tissue more or less firm and vascular. The fatty degeneration of the centres of the masses may lead to liquefaction, and the evacuation of the fluid thus produced causes considerable irritation of bronchi. Cicatrices are often found in the neighborhood of the gummata, and a dry pleurisy is usually set up, which results in dense adhesions. Syphilis never causes a purely serous exudation in the pleura. The diagnosis by physical signs is exceedingly difficult, and the symptoms are apt to be very misleading. Cough, dyspnœa, hæmoptysis, and mucopurulent sputum may all be present, but the absence of the bacilli from the latter will form an important element in the diagnosis. Wasting, as a rule, only occurs when the liver or spleen is attacked by the disease, and it may thus happen that wasting will be progressive while the condition of the lung is improving. The latter tends to become stationary after a while, and if other organs are not affected the prognosis is good. The suspicion of syphilis should always attach to lesions beginning in the lower parts of the lung, and slowly progressing without the production of fever.

AFFECTIONS OF THE HEART.

In late syphilis the heart may be attacked by a chronic inflammation which produces a sclerosing fibrous tissue, and it may be the seat of gummata. The endocardium, the myocardium, and the pericardium may be attacked.

Endocarditis usually coexists with myocarditis. The walls of the heart are more commonly attacked than the valves. The most frequent location of endocarditis is in the left ventricle, at the apex or at the base of the heart near the opening of the aorta. The vegetative or verrucous form is much less common than the fibrous or sclerotic. Gummy endocarditis is usually combined with the fibrous form of syphilitic myocarditis and pericarditis. Its clinical symptoms are indefinite and little known. Very often it runs its course without apparent symptoms. The prognosis is unfavorable.

Syphilitic endocarditis is always circumscribed, and rarely occurs prior to the second year after infection. The fibrous form generally attacks the left ventricle, especially at the apex, the anterior wall, and

the septum ventriculorum. Its origin is found in the interfibrillar connective tissue. The gummy form is generally associated with the fibrous, and affects all parts of the organ and all the layers of its wall. The tumors may attain the size of a hen's egg or a billiard-ball. As long as the destruction of muscular substance is inconsiderable or compensated by hypertrophy of the intact tissue, and as long as the neuromuscular apparatus of the heart is unaffected, the myocarditis occasions no considerable functional disturbance.

Syphilitic pericarditis is rarely primary, but usually follows myocarditis, and therefore involves especially the visceral layer. But the entire pericardium may be implicated. The chronic or fibrous form leads to the formation of a compact, coarse-fibred tissue, to contraction, deformation of the contiguous surface of the heart, and constriction of the great vessels.

Gummata of the pericardium rarely occurs except as the result of the extension of myocarditis. In several cases it has been noted that the process began in the aorta and extended to the heart.

The **symptomatology** of syphilis of the heart shows a wide range. It includes headache, dizziness, flashes of light, loss of strength, palpitation, dyspnœa, feverishness, sore throat. In some cases there were symptoms of angina pectoris, and neuralgic pains like those of aneurysm.

Treatment.—If the nature of the heart lesion is recognized sufficiently early, much benefit may follow energetic antisyphilitic treatment. When uninfluenced by medication syphilis of the heart leads to kidney disease, marasmus, and pulmonary infarction. It is not uncommon to find the coexistence of other specific visceral lesions with those of the heart.

CHAPTER XLI.

TERTIARY AFFECTIONS OF THE VISCERA.

THE LIVER.

THE liver is more frequently attacked by syphilis than any other abdominal organ.

In tertiary syphilis of the liver the following marked conditions may be produced: (1) amyloid degeneration, which results from cachexia; (2) perihepatitis, usually with decided thickening of the capsule, leading to adhesions with surrounding parts; (3) hepatitis, in which there is considerable increase in the connective tissue, followed by shrinking and the formation of cicatrices. Of hepatitis there are two forms—the diffuse and the gummatous.

The **symptoms** are usually so mild that the patient has no suspicion that his liver is attacked until considerable time has elapsed.

The liver may be somewhat enlarged, and is frequently irregular, and on its surface there may be nodular protuberances of the size of a walnut or egg, between which are deep sulci.

Pain, either localized or diffused, in the hepatic region is the most common symptom. It may be sharp and severe or dull and persistent. It is made worse by pressure upon the organ. This symptom generally ceases in a gradual manner.

In cases of perihepatitis pain is sometimes very severe, and when the process is recent a friction-sound may be heard. In these cases the peritoneum is involved by the extension of the morbid process. As a result of pressure upon the portal vein ascites may occur. The spleen may also become affected, and in some cases there is hemorrhage from the stomach. Albuminuria is a very common complication. Patients thus affected have a sickly, earthy look, with perhaps some bronzing of the skin. In some cases there is present a condition of marasmus accompanied with persistent jaundice.

The **diagnosis** of liver-syphilis should be based on the history of the case, on its symptoms, and on concomitant visceral lesions. From cancer it is distinguished by the synchronous albuminuria and splenic enlargement, by the very great irregularity of surface produced by the protuberances, and by its slow stationary condition during a long period of time. In cirrhosis there is usually no history of syphilis, but one of alcoholism is, as a rule, readily obtained.

The **prognosis** of syphilis of the liver is not good, but relief may result from treatment if begun sufficiently early.

Syphilis of the liver occurs more frequently in men than in women, and appears from two to twenty years after the onset of the infection. Peiser, as the result of the study of 34 cases of liver-syphilis (21 men, 13 women), in which the date of infection and of the onset of the visceral disease was clearly made out in 15, found that it began as follows: At 2½ months in 1 case; 2 years in 1; 3 to 4 years in 4; 6 to 7 years in 3; 12 years in 1; 14 years in 1; 18 years in 1; 20 years in 1; 23 years in 1; 25 years in 1. Structural changes in the liver are most commonly found in patients between twenty and fifty years of age.

Cases of the precocious development of hepatitis and perihepatitis in the secondary stage of syphilis have quite rarely been observed.

It has been claimed that syphilis may cause acute yellow atrophy of the liver.

THE SPLEEN.

The spleen may be the seat of structural change in the late period of syphilis.

The late syphilitic processes in the spleen consist of an interstitial and a gummatous infiltration.

In interstitial inflammation the process begins around the blood-vessels, and a diffuse connective tissue which presses on the pulp is produced. In this condition the organ may be much diminished in size. The connective-tissue bands are paler than the normal tissue, from which they do not project at all, but merge diffusely into the surrounding spleen-tissue, contain but little blood and few cells, and in the centre consist of a finely granular material in which a few cells and nuclei are imbedded.

GUMMATA.—Gummata vary in size from that of a millet-seed to that of a walnut, and may be few in number or very numerous. Their number is usually greater when their size is small. In some cases the spleen itself is enlarged. The tumors are usually found near the trabeculæ and deeply seated, or at the periphery of the organ; in the latter case the capsule is thickened. Recent tumors have a reddish-gray color, and are more dense and tough than the normal spleen-tissue; when old they are dry and of a yellowish-gray color. When young they are less clearly defined than at a later period, when they may become distinctly encapsulated. The vessels and the structure of the organ in the neighborhood of the tumors are more or less destroyed. Cicatricial contraction, especially in the capsule, subsequently occurs. The spleen has several times been found adherent to the diaphragm in consequence of peritonitis from irritation by gummy tumors.

We know little of the **symptomatology** of this affection. Enlargement of the spleen is sometimes demonstrable, and in some cases, when the tumors are superficial, inflammation of the capsule and localized peritonitis occur.

In the cases hitherto observed the lesion has generally been accompanied by similar affections of other viscera, and the patients have suffered from cachexia or marasmus.

When the liver or the spleen is attacked by syphilis the morbid process may extend to and involve the peritoneum more or less extensively. This membrane may also become involved when the various other viscera are the seat of syphilitic infiltration.

THE STOMACH.

There are no symptoms which are pathognomonic of syphilitic lesions of the stomach. Syphilis of the stomach is of very rare occurrence, and it is generally recognized after death by means of the microscope.

Several cases have been reported of patients who suffered from gastric pains and vomiting and who died of marasmus, in whose stomachs on post-mortem examination round ulcers were found. In most of these cases the history is incomplete, and though the microscopic findings of the morbid tissues pointed to syphilis in some instances, the patients died of tuberculosis.

INTESTINES.

Our knowledge of the effect of syphilis on the intestines is based on post-mortem studies, and it is at best very meagre. A number of cases are on record in which it is claimed that certain ulcers in the ilium and large intestine were due to syphilis; but their details are so unsatisfactory that they fail to convince one that these lesions were caused by syphilis.

THE RECTUM.

Syphilitic affections of the rectum are to-day not very well understood, but it is possible to describe them in a tolerably clear manner.

Syphilis attacks the rectum in three distinct forms: first, early or rather late in the course of the disease by the extension of indurating œdema, which may accompany infiltrating or ulcerating vulvar or anal lesions, and which tends to the production of more or less complete rings of connective tissue; second, by the formation of true gummatous infiltration; and, third, by the development of a form of inflammation with the production of new connective tissue, in which congestion and exudative products are absent. This third form is a chronic productive or cellular inflammation of slow invasion and of persistent nature.

Indurating œdema complicates early and late syphilitic infiltrations and ulcerations which are seated in the vulva or vagina and near and in the anus. The indurating process then extends to and surrounds the anus, either between the two sphincters or about one, two, or three inches above the internal one. The walls of the rectum become thickened, less supple and extensible, than they are normally, and ulcerated, and if proper treatment is not adopted in the course of several months or a year or two a tough and diffuse stricture is formed. This form of rectal stricture is usually found in syphilitic women in the secondary or early tertiary stage. It is generally the result of neglect of treatment of their lesions. These structures are seated two or three inches within the anal orifice.

In some cases the ulcerations in these cases present points of resemblance to chancroids, and for this reason some authors speak of chancroidal stricture of the rectum. Chronic chancroids may produce stenosis of this tube, but it will generally be found that their bearers also suffered from syphilis.

This form of rectal stricture, if seen and treated early by local and systemic medication, is curable. Its **prognosis** is better in proportion as the infection is recent.

The second form of syphilis of the rectum may or may not result in stricture. The essential features of this affection observed by me will give a clear idea of its nature and course. It was that of a man thirty-three years old, who, after a prolonged attack of diarrhœa, suffered from obstinate constipation and experienced an uneasy sensation in the rectum, particularly at the anus, when at stool and at various times during the day. About two inches above the sphincter, on the posterior wall of the rectum, a thickened patch of mucous membrane two inches long and one and a half wide, with sharp and abrupt margins, could be seen. The surface of this lesion was somewhat papillomatous, and its structure was firm. Under active local and general treatment resolution slowly took place, and a firm cicatrix which did not materially contract the tube was left.

Several similar cases have been reported in which the rectal wall was found to be the seat of gummatous infiltration which on being absorbed has left the tube more or less stenosed. In some cases the full circumference of the tube has been found to be the seat of this morbid process. Local and general treatment is quite efficient in this class of cases.

I have seen several cases in which syphilitic infiltration of the posterior vaginal wall increased in depth and attacked the rectum, which as a result became stenosed.

The third form of syphilitic disease of the rectum is that of annular

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fibroid stricture, and it is not due to an essential syphilitic process, but it belongs in the catagory of parasyphilitic affections, in which this disease shows a tendency to productive and cellular inflammation. This occurs very frequently in the genitals of young, and particularly of old, syphilitic women long after the activity of the diathesis has ceased. In some cases the external genitals are the seat of the hyperplasia, and in others the vaginal walls are attacked.

Either synchronously with the vulvar or vaginal affection, or in an uncomplicated state, this affection attacks the rectal wall and runs around it in ringed form. As has already been stated, there is no hyperæmia, and there are no exudative products: there is simply this chronic productive inflammation, which goes slowly and persistently on, and inevitably leads to the formation of a dense, unyielding ring of fibrous tissue, which may in the end thoroughly occlude the gut. Why syphilis should thus lead to the cellular inflammation localized to a segment of the rectum, from three to six inches above the anus, we do not know. Nor do we know whether any traumatic conditions tend thus to localize this stenosing process. We do know, however, that in some syphilitic women a periproctitis differing in no particular from that found in uninfected women, occurs, and that it entails long suffering, and may lead to death.

LESIONS OF THE KIDNEY, LATE GLYCOSURIA, AND DIABETES INSIPIDUS.

Kidney disease in late syphilis is of rather uncommon, but not of rare, occurrence. In 9000 autopsies Wagner found 63 cases of syphilis of the kidneys; of these, 8 were cases of acute Bright's disease, 4 of chronic, 7 of granular kidney, 6 of atrophy of one kidney, 35 of amyloid degeneration, and 3 of syphiloma or gummata. Bamberger found 49 cases of syphilis of the kidney in 2340 cases of acute and chronic Bright's disease. Wagner follows Beer's division of the pathological changes of the kidneys in syphilis. These are—1. Small circumscribed nodular formations (gummatous tumors) in otherwise normal or differently diseased kidneys. 2. Simple interstitial hyperplasia, mostly irregular, with the formation of cicatrices in otherwise normal kidneys. 3. Diffuse cellular hyperplasia of the interstitial tissues, mostly with degeneration of the vessels and atrophy of the new formation, as well as peculiar parenchymatous changes. These latter were particularly small fatty deposits, lardaceous degeneration being common in this form. 4. Purely parenchymatous changes. According to Wagner and Beer, only the first and third forms are absolutely characteristic of syphilis.

There are no pathognomonic signs or symptoms of tertiary syphilis

of the kidneys. The symptoms are emaciation and various forms of dropsy, together with the presence of albumin in the urine.

Late Glycosuria and Syphilis.

The question of the relation between syphilis and glycosuria, or diabetes, has of late been much studied, but still there is much to be learned.

Patients suffering from diabetes, who later on contract syphilis, usually present a severe order of primary and secondary manifestations, due to the hybrid morbid condition. In many instances the initial lesion in these subjects is more exuberant and shows decided tendency to ulceration. With the onset of syphilis, which is usually very rapid, diabetes seems to induce a condition of deep cachexia, and as a result the course of the disease is more severe and less amenable to treatment. In these cases mercury should be used very guardedly. In general, the mixed treatment works well toward the end of the first year. Several writers have stated that sugar seems to leave the urine more rapidly in syphilitic than in other patients. Several instances are known in which sugar disappeared at the breaking out of specific manifestations, and reappeared on the cessation. In diabetes and syphilis there is frequently observed a fermentation of the sugar in the mouth, which produces severe and rebellious ulcerative lesions. Though this morbid combination tends to induce great deterioration of nutrition, the consoling fact remains that in some syphilitic sugar disappears more permanently than in those uninfected.

That syphilis, therefore, may in some mysterious manner cause diabetes there can no longer be any doubt. So many cases have been reported in which no other pathogenic cause than syphilis could be ascertained that the conclusion is warranted that diabetes may result from the effects of that far-reaching infection, either by its disturbance of the liver and of the blood-making function, or by reason of some change in the fourth ventricle or in its vicinity.

Diabetes may occur within the first few months of infection within one or several weeks, and it may occur in the tertiary stage.

Diabetes Insipidus.

In the course of syphilitic disease of the brain, particularly when seated at or near the floor of the fourth ventricle, diabetes or polyuria is sometimes observed. It has no distinguishing characteristics, and its chief symptoms are inordinate thirst and the discharge of large quantities of pale urine of very low specific gravity, in which neither sugar nor albumin is found.

A number of interesting cases are to be found in literature.

Lecorché and Talamon have reported the case of a thirty-four-year syphilitic man who had been infected fourteen years before, and who for six years had passed nine to ten litres of urine daily. Under treatment the quantity was reduced to five litres.

Sourouktchy has reported the case of a twenty-five-year-old man who, when seven months syphilitic, was affected with great thirst, and passed large quantities of urine free from sugar and albumin. He was promptly cured by the use of mercurial inunctions and of iodide of potassium internally. The reporter of the case thought that there was a syphilitic affection of the ependyma in the floor of the fourth ventricle.

In a case reported by Buttersack, in which the woman suffered from vertigo, neuralgic pains, and pains in the head, and who voided a large amount of characteristic urine, on post-mortem examination chronic descending leptomeningitis, with implication of the trigeminal and spinal nerves, was found.

The *suprarenal capsules* have in a few cases been found to be the seat of connective-tissue increase and gummatous infiltration. A case is reported in which during life the morbid conditions of Addison's disease were observed, and at the autopsy what appeared to be gummatous degeneration of the suprarenal capsules was found.

CHAPTER XLII.

SYPHILITIC AFFECTIONS OF THE MUSCLES, TENDINOUS SHEATHS, APONEUROSES, AND BURSÆ.

MYOSITIS.

MYOSITIS is sometimes found in secondary syphilis, but generally in the tertiary stage. It occurs in three principal forms: first, the irritative or hyperæmic; second, the chronic infiltrative; and, third, in the form of gummatous nodules.

Irritative myositis is usually seen to coexist with the early manifestations, particularly of the lower joints and tendons, and it is attended with rheumatoid pain, soreness, and perhaps impairment of function. The myalgias produced by the early irritative syphilitic process are, as a rule, ephemeral and readily yield to proper treatment. In this form of myositis no permanent structural change is produced.

Chronic myositis tends to more or less permanent contraction of the member or parts on or in which the muscle is situated. It occurs in two forms—the localized and the diffuse.

According to Virchow, this lesion is analogous to that produced by rheumatic inflammation. "In the interspaces between the muscular fasciculi a connective tissue is developed, which hardens and results in atrophy, and finally in the destruction of the primitive muscular fibrils." We thus find at the outset the presence of abnormal nuclei, cells, and fibres in the cellular tissue, and afterward a secondary degeneration of this new formation, resulting in atrophy of the normal elements, contraction of the muscle itself, and in some instances calcareous and bony deposits. This lesion usually escapes observation until the contraction of the muscle, interfering with motion or producing flexion of the limb, attracts attention.

As a rule this affection causes no pain, but exceptionally a dull, aching sensation is complained of.

One or more muscles may be attacked. Those most frequently affected are the flexors of the upper extremity, and especially the biceps.

The contraction comes on insidiously, and the first symptom noticed by the patient is an inability to extend the limb. On examining the affected muscle no change is perceptible by palpation either in its size or texture; its power of contraction is normal; and there is simply a diminution in length, as shown by its tension when the limb is forcibly extended. The tendon of insertion of the biceps is always prominent and

tense, and the muscle itself appears to be in a state of partial contraction. Somewhat rarely the masseter muscles, one or both, may be attacked.

GUMMATOUS TUMORS.

These tumors begin in round-cell infiltrations around the vessels of the perimysium. They grow slowly and usually without pain, and reach various sizes, and sometimes, as in Koehler's case, they involve a large mass of muscles. In this case the tumor extended from the left hypochondrium to the inguinal fold, and from the linea alba to the axillary line. In Netter's case the tumor was seated in the sartorius muscle, was subaponeurotic, and was five inches long by four inches wide. These tumors are of various shapes, globular, fusiform, flat, or irregular, according to the nature of the parts in which they are seated. When superficial they become adherent to the aponeurosis, which becomes inflamed and hypertrophied. Being frequently developed near the ends of the muscles, the tendons are sometimes secondarily involved.

They are most easily detected when the muscle is relaxed, and their independence of the subjacent bone can then be best established. They excite little or no pain, unless the muscle be put upon the stretch, and their chief inconvenience is due to their interference with motion. They sometimes produce contraction of the muscles, but this is not a necessary result.

These gummatous tumors of the muscles may, in exceptional cases, undergo softening, break down, and form deep ulcers.

They are very often accompanied by other syphilitic manifestations, such as nodes, exostoses, tubercles of the cellular tissues, or ulcerations of the fauces.

Their **prognosis** is good, particularly if they are treated early.

The diffuse and the localized myosites are rather rarely found in combination.

AFFECTIONS OF THE TENDINOUS SHEATHS AND OF THE TENDONS AND APONEUROSES.

These structures are sometimes attacked in early and in late syphilis. In the early stage, and in the second and third years of syphilis, these parts may be the seat of an irritative process which may give rise to effusion or to the development of fibrous tissue. In tertiary syphilis they sometimes become infiltrated by gummatous deposits.

We sometimes see swellings which occur on the backs of the hands, and which follow the course of the tendons, but never extend beyond the dorsal ligament; they are of triangular shape, with their base toward the fingers. They are due to effusion and yield a sensation of

fluctuation; they cause little, if any, pain, unless of unusually large size, when the skin over them may be inflamed and painful. They occur in the early years of syphilis and are developed rapidly.

The tendons of the wrist, ankle, foot—in fact, any tendon—may be thus attacked. The lesion is a hyperæmia of the sheath attended by serous effusion. The shape of the resulting tumors varies according to the conformation of the parts.

They are firm and elastic and sometimes fluctuate. The overlying skin is frequently reddened. They form rapidly, and are often attended with pain. Fournier believes that many of the early pains of syphilis are due to hyperæmia of the sheaths of the tendons, and especially that the pain sometimes present in the bend of the elbow, intensified by firm pressure, is due to inflammation of the tendon of the biceps.

Tendons may, in rare cases, be the seat of gummy infiltrations, which exist in the form of small subcutaneous tumors, usually unattended by spontaneous pain. After remaining indolent for a long time they may break down and form troublesome ulcers.

The aponeuroses may be the seat of localized or diffuse fibroid infiltration.

AFFECTIONS OF THE BURSÆ.

The bursæ are rather infrequently attacked by irritative and hyperplastic processes in secondary and tertiary syphilis.

In the secondary period, sometimes coincidently with the onset of general manifestations, one or more bursæ are affected. As a result, we find decided swellings—not, however, very sharply definable—under the skin, which may or may not be hyperæmic. These early bursal swellings on palpation yield a fluctuation or a doughy sensation. They are sometimes rather sensitive, but not, as a rule, painful. They disappear promptly under specific treatment, provided the parts on which they are seated are put at rest and are not subjected to pressure. In the first five years of syphilis hyperplasia of bursæ somewhat rarely occurs in the form of sharply circumscribed, rather firm tumors, which run an indolent and painless course until affected by local and general treatment.

In the tertiary stage affections of the bursæ are not infrequent. The bursæ over the patellæ are most commonly attacked. The lesion is a gummous infiltration with formation of connective tissue. It begins insidiously and without pain; the patient's attention is first attracted by a hard movable lump beneath the skin. It varies in size and shape in different bursæ. Over the knee-joint we have found tumors as large as a walnut or as an egg. (See Fig. 153.) The tumor may remain indolent for a long time, giving very slight discomfort. In so[illegible] it is excessively

hard, in others it is quite elastic. Sometimes the parts seem to be infiltrated with fluid. If not treated, and particularly if subjected to irritation, the tumor grows and becomes adherent to the overlying skin. Inflammatory symptoms appear and the integument over the bursæ ulcerates. The inflamed and infiltrated bursa may sometimes be seen at the base of the ulcer. Under such circumstances the course of the

Fig. 153.

Tertiary syphilis of the bursæ patellæ.

lesion is very tedious. In other cases, even of very large tumors, treatment causes their absorption within two or three months. The lesion may be unilateral, but frequently attacks both patellar bursæ. In many cases traumatism is an important exciting cause; in others the bursæ are secondarily involved by the extension of gummatous infiltration from adjacent parts. Relapses are quite frequent.

This affection occurs most commonly in women. Gummatous bursitis appears both early and quite late in tertiary syphilis.

CHAPTER XLIII.

SYPHILITIC AFFECTIONS OF THE BONES, JOINTS, FINGERS, AND TOES.

AFFECTIONS OF THE BONES.

THE bones are sometimes attacked in the secondary period of syphilis, but osseous affections are more common in the tertiary stage. While the secondary lesions of the bones are usually cured very readily, those of the tertiary period are very persistent and prone to undergo degenerative changes.

The pathological changes in bones are osteoperiostitis, rarefying osteitis, and intense rarefying osteomyelitis or gummatous osteoperiostitis. From these morbid conditions formative osteitis, or eburnation, exostoses, or nodes, necroses, and sequestra result.

Syphilitic osteoperiostitis is very similar to the simple form. It is limited to the superficial layers of the bone and to the periosteum, and chiefly attacks the long bones and the cranial bones.

The affection begins in the connective tissue and around the vessels of the Haversian canals. Thus the parts are infiltrated with numerous round cells. Besides the cell-infiltrations into the periosteum, the membrane is also œdematous. These conditions are found in the early stages of osteoperiostitis. In the bones the Haversian canals become enlarged and filled with marrow, which is either red or embryonal or gray and gelatinous. In the stage of œdematous infiltration osteoperiostitis may undergo resolution from the effect of specific treatment.

When the process becomes old the newly formed cells act as osteoblasts and new bone-tissue is formed. As a result, we find swellings of the bones, which are called exostoses and periostoses. This hyperplastic process is called formative osteitis or eburnation.

In ramifying osteitis the subperiosteal tissue and the osseous marrow contain small round cells and transuded red corpuscles. When this exudation of cells is intense, the bone-tissue becomes eroded and destroyed upon the internal surface of the Haversian canals. The osseous lamellæ are destroyed, and replaced by inflamed marrow. Under treatment this process may be stayed and cured.

Gummatous osteomyelitis and osteoperiostitis are more advanced conditions than those just described: the subperiosteal embryonal tissue and the medullary tissue are much more abundant, and these structures become arranged like that of gummatous

Osteoperiostitis.

The bones most liable to be attacked by osteoperiostitis are those which are the most superficial, as the tibia, ulna, clavicle, sternum, and cranium, but no portion of the skeleton can be said to be exempt. The external manifestation of this affection consists in ill-defined, doughy tumors of variable size, shading off gradually into the surrounding tissues, adherent to the osseous structure beneath, but independent of the overlying integument, usually very sensitive to pressure, the seat, at certain hours in the twenty-four, of severe pain, and bearing the

Fig. 154.

Osteoperiostitis of tibia.

common name of nodes. (See Fig. 154.) A striking particularity of the pains produced by nodes is their marked nocturnal character. They are generally absent or are scarcely felt during the day, but return at

night with great severity after the patient retires to bed, and only abate toward morning.

In the majority of cases of nodes the infiltration is absorbed under appropriate treatment and the tumor undergoes resolution. In other cases the inflammation is more acute; the skin becomes adherent to the tumor, is reddened and thinned; degeneration and softening take place, and an opening is formed; the ulcer shows little or no tendency to extend, but a superficial portion of the bone to a limited extent usually becomes necrosed and comes away, and an adherent cicatrix is the final result.

Exostoses.

When eburnation of the bony tissue is developed the result is an exostosis. Such new growths are often, for a time at least, movable upon the bone beneath, and are then called *epiphysary exostoses.* In this form they are due rather to periostitis than ostitis; they are generally of small size, sometimes thin and flat, sometimes hemispherical or pedunculated, and at times annular. They acquire greater consistency with time, and finally present an eburnated texture. Arrived at this point, resolution is no longer possible; the tumor remains stationary, and treatment has no other effect than to quiet the osteocopic pains. If resolution be attained at an early period, their surface, which before was smooth, becomes irregular, indicating partial absorption. Sometimes this absorption continues after the whole of the tumor has disappeared, so that local atrophy of the bone succeeds the exostosis. In other instances syphilitic exostosis is not preceded by periostitis, but is the result of ostitis terminating in hypertrophy of the normal bony tissue, in which case it is denominated *parenchymatous exostosis.*

An exostosis situated externally rarely occasions sufficient inconvenience or deformity to necessitate its removal by an operation unless under peculiar circumstances.

Exostosis may spring from the internal surface of the cranial bones, and give rise to symptoms of the most serious character, as convulsions and the various forms of paralysis. The frontal bone is by far the most frequently affected in this manner.

Syphilitic exostosis of the vertebræ, either external or within the spinal canal, is rare.

Syphilitic exostoses may generally be distinguished from similar growths due to other causes by the nocturnal pains attending them, by their usually occupying the continuity of the more superficial bones, by their hemispherical form, and by the fact that they are rarely multiple or symmetrical on opposite sides of the body.

Gummatous Osteoperiostitis and Osteomyelitis.

The bones most commonly attacked by these processes are the long bones, the cranial bones, and the bones of the fingers and toes.

When the bones of the skull are affected, one or more nodes are developed. As a rule, in the late secondary and in the early tertiary stages we find several or, in rare cases, as many as twenty, nodes on

Fig. 155.

Gummatous osteoperiostitis: multiple nodes of the skull-bones.

the cranial bones, whereas at late periods there may be but one or two. These multiple cranial nodes usually make their appearance by crops of one or more. Single nodes run a slow course, and one may be followed by its successor after the lapse of months or years.

In Fig. 155 multiple gummatous nodes are well shown.

The bones of the face, particularly the malar bones, may be attacked

by gummatous osteoperiostitis, and in the course of the affection mild or severe neuralgic pain may be felt. (See Fig. 156.)

The superior maxillary bone is not infrequently attacked. The first symptoms are local swelling and pain, and later the cheeks and the tissues around the eyes become red and œdematous. Very often the

Fig. 156.

Showing a large cranial node, necrosis of skull, cicatrix of skin, and fall of nose.

whole bone is destroyed. In some cases the periosteum is left intact and a new bone forms.

The inferior maxillary may be the seat of nodes on its external surface or lower border.

The clavicle, scapula, and ribs are not uncommonly the seat of nodes of varying sizes. Gummata of the scapula may be mistaken for cold abscess and osteosarcoma, and it is always well to think of syphilis in all cases of swellings of this bone.

A goodly number of cases of gummatous osteoperiostitis of the vertebræ have been published. In these cases pain caused pressure on

the nerves was complained of, and in some cases there was paralysis of the upper or lower extremities.

The bodies of the vertebræ are much more frequently attacked than are the arches. In a number of cases of syphilis of the vertebræ strikingly beneficial results have followed the use of the mixed treatment.

Fragility of Bones.

As the result of local inflammation and cell-infiltration in cases of rarefying and gummatous osteoperiostitis the structure of bones sometimes becomes fragile, and they are fractured by muscular contraction or mild or severe traumatism. It is probable that non-union is either due to a depraved condition or to the fact that the newly formed embryonal tissues do not produce an ossifying callus, but, on the contrary, caseous, fatty, and sclerotic tissues, which tend to produce false joints. In these cases local and general medication and good hygiene are very essential.

AFFECTIONS OF THE JOINTS.

The joints are frequently affected by syphilis in both the secondary and tertiary stages. In some instances the morbid process begins in the joint-structures, and in others inflammation of the articular ends of the bones and of the large tendons inserted near the joint involves the latter secondarily.

Synovitis of the Late Stage.

The synovitis which occurs late in the secondary and during the tertiary stage is also markedly subacute. It is attended with the same symptoms, and is mainly distinguishable from that of the earlier period by appreciable lesions of the joint-structures. The attention of the patient is called to the affection by slight pain and impairment of motion, and the joint is then found somewhat enlarged. The effusion into its cavity takes place slowly and perhaps intermittingly, so that in many cases several months elapse before the joint is very decidedly enlarged. When the affection is fully developed we find evidence of intra-articular effusion and general thickening of the fibrous coverings and of the synovial membrane.

This affection may remain in an indolent condition for years without undergoing further changes. There is little tendency to complete ankylosis, though quite frequently there is more or less erosion of the articular cartilages, as shown by the crepitation on motion. We seldom find sinuses near the joints, and the stationary character of the affection is in marked contrast to the tendency to degeneration which is such a

prominent feature of the tuberculous affections of these parts. The knee-joint is the one most commonly attacked.

Late syphilitic synovitis may be complicated by tuberculosis, and the mixed condition then produced is very rebellious to treatment, which is sometimes signally efficacious in the true syphilitic affection.

In many cases a history of syphilis points to the nature of the affection. Then in tuberculosis this morbid process usually exists elsewhere, particularly in the lungs. In the mixed form of synovitis it is often impossible to make a sharp diagnosis.

In some cases in which there is a syphilitic affection of the tendons inserted near a joint there is a coincident effusion into the cavity of the latter. This occurs slowly and painlessly, and disappears on the subsidence of the disease of the tendon.

The **prognosis** of this affection is rather more serious than that of the earlier form. If it is submitted to treatment early, it is in general curable; but if it is neglected, permanent thickening occurs, and consequently more or less impairment of motion.

The constitutional **treatment** consists in the administration of the iodide of potassium and of mercury in full doses. The joint should be enveloped in lint thickly spread with mercurial ointment, over which cotton-wool is placed and the whole retained in place by means of a firm muslin bandage.

AFFECTIONS OF THE FINGERS.

Dactylitis Syphilitica.

The affection is caused both by acquired and hereditary syphilis, and of it there are two varieties: first, that in which the morbid process begins in the bones and periosteum, subsequently implicating the joints; and secondly, in which the morbid deposit occurs in the subcutaneous connective tissue of the fingers or toes, and which may extend to the joints.

These varieties are constantly found, and their adoption will simplify description. In the first form the lesion develops slowly and first attracts the patient's attention by the slight enlargement of one or more fingers or toes. The swelling gradually increases and the member becomes hard and firm. The skin becomes somewhat stretched and perhaps hyperæmic. Wh n the toes are affected their whole length is generally included; but when a finger is attacked the lesion may be quite sharply limited to one phalanx, almost invariably the proximal one, or the adjacent phalanx may be involved to a less degree. (See Fig. 157.) The distal phalanges and the metacarpal bones may also be attacked (see Fig. 158), or, finally, the whole finger

Fig. 157 shows the infiltration into the first and second phalanges of the left hand.

Fig. 157.

Dactylitis syphilitica.

These swellings are usually developed slowly and painlessly, but in some cases a dull aching pain is present.

Within a few weeks after the development of the affection symptoms of joint-implication may appear. At first flexion of the joints is im-

Fig. 158.

Dactylitis syphilitica.

paired by the swelling. In the course of one or two months, if no treatment is instituted, the joints become flaccid and unnaturally mobile. Sometimes in this variety of dactylitis there is slight hydrarthrosis, and

often crepitation in the metacarpophalangeal joint or between the articular surfaces of two phalanges.

The first form of dactylitis is sharply limited to the bone, and is due either to specific periostitis or osteomyelitis. The affection may progress rapidly, slowly, or with intermissions. The earlier after the infection the lesion occurs the more acute is its course.

Fig. 159.

Dactylitis of the second phalanx with gummatous deposit in the skin, which has ulcerated.

The proximal phalanx is most frequently, the distal phalanx least frequently, involved.

The fingers are attacked more commonly than the toes; in a few cases they have been involved simultaneously. More than one phalanx of the same finger may be affected as well as several fingers, either unilaterally or symmetrically. In the latter case swelling of one or more toes is likely to occur at the same time.

The metacarpal, and less frequently the metatarsal, bones may become swollen coincidently with dactylitis, or they alone may be affected. In some cases an effusion into the joint-cavity takes place slowly and without pain.

These bony swellings may remain in an indolent condition for a long time, and finally the gummy deposit may be absorbed, or it may soften and be discharged through a sinus. The shaft of the bone may resume its normal size, or it may be rendered much thinner and lighter. Sometimes it is shortened, and in other cases again it is slightly longer than normal. The bone may be left in a condition of eburnation, being decidedly thickened.

The process of involution may be slow or quite rapid, and seems to be in proportion to the rapidity of the development of the lesion. In most cases the deformity is not very marked; in some cases of necrosis a less fortunate result is obtained (Fig. 160). The illustration shows deformity and shortening of the index-finger so that its extremity scarcely reaches the first phalangeal joint of the middle finger. In this case the greater part of the first phalanx and the distal extremity of the metacarpal bone had been absorbed, and the

two bones were connected by fibrous tissue. In a similar manner the second phalanx of the ring finger had been shortened to about one-fourth of its original length. After the process of absorption is complete the contiguous bones are always united by a ligamentous band, which serves as a joint. The function of a finger is, of course, greatly impaired, and excessive deformity may result. The manner in which the soft parts adapt themselves to the altered condition is remarkable, their contraction being of great service in giving solidity to the false joints.

The second form of dactylitis is much less common than the first variety. The essential lesion is gummatous infiltration into the subcutaneous connective tissue of one or more fingers. Generally the new

Fig. 160.

Showing shortening of the index-finger from absorption of part of the phalanx and of the metacarpal bone.

formation involves the whole length of the finger, but in some cases only a portion (usually in the neighborhood of a joint) is swollen. Fingers or toes thus attacked are much larger than normal, often hard and tense, and more or less chronically hyperæmic.

This affection may run a slow, indolent course and end in resolution; or degenerative changes may attack the infiltration, in which event an abscess is formed (see Fig. 159).

In this form of dactylitis, when the process is very chronic, the joint-structures may be attacked, in which event subsequent deformity and disability are observed.

Diagnosis.—So marked are the features of the bony swelling of dactylitis syphilitica that the affection is readily recognized. The history of the case may reveal the specific origin of the trouble, or the history of antecedent and the presence of concomitant syphilitic lesions

may make the question clear. The slowness of growth, the indolent course, and in most cases the good effect of antisyphilitic treatment will point to the syphilitic origin of the bony tumors.

The subcutaneous variety in its early stage may be mistaken for perionychia; but the absence of acute inflammatory symptoms, especially pain, establishes the diagnosis. Dactylitis of the great toe might be mistaken for gout but for the subacute character of the former.

The **prognosis** depends in a measure upon the period at which the lesion is recognized. When the swelling is developed quickly, rapid involution follows energetic treatment. The longer the swelling has persisted the less amenable to treatment it becomes.

In some cases, particularly in children, the syphilitic process is complicated with tubercular infection, in which event antisyphilitic treatment is useless and degenerative changes are prone to occur.

The **treatment** is that of late syphilis, a combination of the iodide of potassium with a mercurial; locally, mercurial ointment or plaster applied with pressure is beneficial.

CHAPTER XLIV.

SYPHILITIC AFFECTIONS OF THE PENIS, OS UTERI, UTERUS, AND VAGINA.

In somewhat rare cases a diffuse gummatous infiltration occurs in the submucous connective tissue of the glans penis, either in a localized or general form. This new tissue may break down, and as a result we sometimes see deep ulcers which are indistinguishable from chancroids in appearance. In exceptional cases more or less of the glans itself may be the seat of gummatous infiltration.

It is necessary also to remember that relapsing indurations occur early and late in syphilis, and that they are found in the glans, prepuce, at the meatus, and in the urethra.

NODES IN THE CORPORA CAVERNOSA.

In some cases nodules varying in size between that of a pea and a nutmeg may be found in the meshes of the corpus cavernosum. These tumors are usually round. They are generally sharply defined, have a moderately firm consistence, and may present cartilaginous hardness.

These lesions develop very insidiously, and in speaking of them patients usually say they knew of no trouble until they noticed the lump in the penis. As a result of the infiltration the penis becomes curved in various directions when erect—laterally, upward, and backward and downward. If these swellings of the cavernous bodies are allowed to become chronic, they produce much structural deformity of the penis. They rarely soften and break down. They are promptly influenced for the better by antisyphilitic treatment.

Infiltrations of the size of a pea or of a hazelnut are not frequently found in the corpus spongiosum, and may extend to the parts beyond. They run an indolent course and rarely break down, but become sclerotic and produce intractable urethral strictures.

EXULCERATIVE HYPERTROPHY OF THE UTERUS.

This affection consists in a total or partial enlargement and hardening of the os, which appears congested and is more or less superficially ulcerated; its surface is granular or often presents a varnished aspect. The hypertrophy is greatest in the transverse diameter. The parts are indurated and resistant, or sometimes doughy, and generally are not

sensitive to manipulation. In most of the cases there were no symptoms referable to the uterò-ovarian system ; in others the patients complained merely of certain unpleasant sensations, such as pain in the loins, back, and thighs, and a bearing-down feeling. The secretion from the ulcer is scanty and mucopurulent, and is infectious like the secretion from other secondary lesions. The affection may be accompanied by various displacements of the womb.

AFFECTIONS OF THE OVARIES, FALLOPIAN TUBES, UTERUS, AND VAGINA.

Syphilitic affections of the ovaries are rarely met with ; they present a close analogy to syphilitic affections of the testicle, and are either diffuse or circumscribed. Lancereaux has only met with the diffuse form after it had arrived at the stage of atrophy ; the ovaries were of the usual size or smaller than natural, fibrous in structure, with scattered cicatrices, and destitute of Graafian vesicles, although the patients had not yet arrived at the usual age for the cessation of the menses.

The **symptoms** of these affections are said to be a slight, dull pain in the region of the ovaries, possibly at the outset some increase in the size of these organs perceptible on abdominal and vaginal palpation, a loss of sexual passion, and sterility. It is evident that these signs, taken in connection with the history of the case, can only furnish a probability of the nature of the disease. The success of antisyphilitic treatment may be of diagnostic import (Lancereaux).

No instance is known in which the Fallopian tubes have been affected with syphilis.

Certain cases in which uterine tumors in syphilitic subjects have yielded to the internal administration of iodide of potassium and mercurials render it probable that this organ is not exempt from the late manifestations of syphilis; but nothing more definite is known upon the subject, since post-mortem investigation has been wanting. The vagina is in rare cases the seat of localized gummatous infiltration, which is usually developed on the posterior wall. This infiltration may extend to the rectum and give rise to stricture of that tube. The breaking down of this new growth sometimes leads to the development of rectovaginal fistula.

CHAPTER XLV.

SYPHILITIC AFFECTIONS OF THE EPIDIDYMIS AND TESTIS.

LIKE all organs and structures rich in connective tissue, the testicle and its appendages are attacked both early and late in the course of syphilis.

THE EPIDIDYMIS.

In somewhat rare cases the epididymis is the seat of an irritative process at the time of the general manifestations. One or both may be slightly enlarged, sensitive, and mildly painful. This ephemeral condition promptly yields to treatment. It may occur in patients who have suffered from gonorrhœa and its epididymitis, and in those who have never been thus affected.

In some cases syphilitic epididymitis begins insidiously, and is not recognized until "a lump" is felt by the patient; in others a slight uneasiness attends its formation. Upon examination we find a round or oval tumor of the size of a pea to a lima-bean just above the testis, the scrotum itself being unaffected. It usually has a smooth surface and is of a decidedly firm consistency. It may be seated in one epididymis only, but usually both are affected. Such tumors remain in an indolent condition without showing any tendency to degeneration, and they always promptly disappear under mercurial treatment. Other portions of the epididymis or the testicle itself are commonly not attacked simultaneously.

This affection is usually a somewhat precocious manifestation of syphilis, occurring in most cases within the first six months, and sometimes as early as the second month, or, again, as late as the fifth year, after infection. It is more commonly unilateral when it occurs at a late period. An important point in the diagnosis of this affection is that, as a rule, it attacks the globus major, whereas in gonorrhœal epididymitis the globus minor is most commonly involved alone.

Late in the secondary and in the tertiary stages the epididymis may be attacked. The resulting affection is of slow and usually painless growth, and, as a rule, patients are ignorant of the presence of any testicular trouble until they discover a lump on the organ. The epididymis, in part or in whole, is then found to be swollen and hard, and perhaps a little sensitive on pressure.

No sharply drawn description can be given of the condition of the

epididymis when the seat of tertiary syphilis. This appendage may be uniformly and evenly swollen, it may be the seat of bulbous expansions, and it may be markedly nodular. In uncomplicated cases, particularly if seen quite early, prompt resolution of the hyperplasia may follow active internal and local treatment. When seen late, treatment has a limited effect, for the reason that dense fibrous tissue or caseated gummatous tissue has been produced, and much disorganization has resulted. In general, even after what may be called good results have been produced, more or less firmness and rigidity of the parts are left.

Diagnosis.—The early form of epididymitis is generally easy of recognition, since it usually coexists with or rapidly follows general manifestations. In many cases a clear history of syphilis is readily obtained.

In the later syphilitic epididymitis it is often very difficult to arrive at a satisfactory diagnosis. In a given case we must bear in mind that an antecedent inflammation, caused by gonorrhœa or some other infectious disease, may have been the underlying cause of the swelling. In cases of chronic posterior urethritis it is not uncommon to find a chronic fibroid epididymitis, which may develop acutely and then run a chronic and painless course, or it may begin insidiously in a sluggish manner, or there may be exacerbations of acuity. When in these cases a history of syphilis is also obtainable, it is often impossible to determine whether that diathesis has any influence upon the morbid process.

Chronic epididymitis may result from trauma, but usually a clear history may be obtained.

In some cases of late syphilitic epididymitis there is a symbiosis with tuberculosis, and it is utterly impossible to make a sharply drawn diagnosis. The physical signs are sometimes very similar and even identical, and our reliance is then to be placed on the results which follow active local and general antisyphilitic treatment. Syphilitic conditions are thereby more or less benefited, while in tuberculosis at the best only a moderate improvement may follow the use of the iodide of potassium.

It is always well in cases of chronic epididymitis, even if nodulation is present, not to jump too hastily at the conclusion that tuberculosis is the cause, which now-a-days is so frequently done. In considering these cases, the surgeon should bear in mind chronic posterior urethritis, trauma, antecedent infectious processes, syphilis, tuberculosis, and the tuberculo-syphilitic symbiosis.

In some cases of early and late syphilitic epididymitis the juxta-testicular part of the vas deferens is the seat of irritative, hyperplastic, or gummatous changes.

THE TESTIS.

In tertiary syphilis the body of the testis and the tunica vaginalis may be attacked by chronic hyperplastic processes peculiar to that period. In general, the body of the testis is alone attacked, and exceptionally there is coincident involvement of its serous tunic.

Tertiary lesions of the testis begin in a painless and insidious manner, without any of the ordinary signs of inflammation. Some patients complain of an uneasy sensation in the organ, but, as a rule, no attention is paid to the progressing affection until the weight of the swelling produces a moderate pain in the loins and inguinal region. When seen early, a case of syphilitic orchitis or sarcocele presents no well-marked features. The organ is found to be uniformly swollen, and quite hard and firm in consistence, and it is less sensitive than in a normal state. In some cases a small portion of the apparent swelling is dependent upon hydrocele, since in nearly every instance of syphilitic orchitis there is a slight effusion into the tunica vaginalis. When the amount of fluid is considerable it may be necessary to evacuate it by puncture before a satisfactory examination can be made; but in most cases we may by firm pressure sufficiently displace the fluid to reach the body of the testicle and determine its condition by palpation. At an early stage of the disease the testicle may in a minority of cases be found to contain one or more distinct masses of induration, which form projections upon the surface of the size of the head of a pin, pea, or even an almond, but which are never so prominent as to change the general contour of the organ. These projections are due to an effusion of plastic material, of the same nature as gummy tumors, upon the surface of the tunica albuginea. As the disease progresses the distinct masses of induration coalesce and form a hard, resistant tumor, which preserves to a great extent the normal shape of the testicle. In some very rare cases the onset of syphilitic orchitis has been sudden and attended with much pain. As a rule, the tumor is smooth throughout its whole course, in which event the clinical picture has been that of acute gonorrhœal epididymo-orchitis.

Testicular tumors of late syphilis may be as large as a fist. They are ovoid or globular, smooth, and firm as a billiard-ball, and when elevated in the palm of the hand they seem very heavy. As a rule, no pain is present, and much pressure can be borne without discomfort to the patient.

In somewhat rare cases, particularly when the gummatous infiltration is localized in nodules and masses, the morbid tissue may break down and an abscess-cavity be left. In some cases excessive proliferation of the tissues occurs, and a fungus of the testicle is produced.

The **course** of this affection is exceedingly chronic, frequently lasting for several years. The sexual desires are not changed unless the lesion has made great progress in both testicles.

When recognized at a sufficiently early period, syphilitic orchitis may almost invariably be arrested and the organ restored to its original integrity. If left to itself, it most frequently terminates in obliteration of the seminiferous tubules and complete or partial atrophy corresponding to the extent of the adventitious deposit; or, again, the parenchyma of the gland may degenerate into fibrous, cartilaginous, or even osseous tissue.

Diagnosis.—The smooth and hard syphilitic orchitis is generally easily recognized. In a given case it is well to bear in mind that a very firm hydrocele tumor with thick walls may be mistaken for syphilitic sarcocele, and that cystic sarcoma, villous cancer, and carcinoma, and exceptionally tuberculosis of the testis, may exist in the shape of smooth, round, ovoid, and pear-shaped swellings, which, at the period of development and before degenerative changes have taken place, may in every particular resemble the syphilitic testicle.

Localized nodular gummatous infiltration may be mistaken for tuberculosis. In many cases of syphilis no history can be obtained, and in cases of malignant disease it also may be absent. It is well, therefore, in all cases of chronically enlarged testis where the history is doubtful, to cause the patient to undergo a carefully watched but sufficiently vigorous local and general antisyphilitic treatment. If syphilis exists, improvement will soon be noted, and in most cases a brilliant cure will be obtained. When, after a thorough tentative antisyphilitic treatment, the testicular swelling remains uninfluenced or increases in size, the surgeon may quite confidently conclude that the case is one of malignant disease or of tuberculosis. In malignant disease there is no enlargement of the inguinal ganglia until the process has extended to the scrotum, and in late syphilis the condition is similar. In many cases of syphilitic sarcocele there is no evidence of ill-health, which will generally be noted in the other classes of cases just mentioned.

We have no precise knowledge of the effects of syphilis upon the prostate, seminal vesicles, and bladder.

Treatment.—This should be actively pushed. Iodide of potassium in large doses or the mixed treatment may be given internally. Locally the organ should be enveloped in lint copiously smeared with mercurial ointment and supported by a snug suspensory bandage.

CHAPTER XLVI.

SYPHILITIC DEGENERATION OF BLOODVESSELS.

ANEURYSM.

WITHIN the past twenty years the conviction has been growing in the medical mind that syphilis is an active and frequent factor in the production of aneurysm. This view, at first based on clinical observations, has since been confirmed by the results of microscopical studies. With the expansion of our knowledge of the pathology of syphilis the fact that this infection during its whole course largely attacks the bloodvessels has called particular attention to it as a primary cause of aneurysm.

The aorta is the vessel most frequently attacked; but the radial, temporal, cerebral, and popliteal arteries are also frequently involved.

Many cases have been reported in which, undoubtedly, syphilis was the etiological factor. Then, again, there are cases on record in which it is difficult to eliminate the influence of trauma, gout, rheumatism, lead-poisoning, alcoholism, and arteriosclerosis. In some cases there can be no doubt that several factors, including syphilis, were the underlying cause of the arterial degeneration.

In considering the influence of syphilis in the causation of aneurysm it is not only necessary to bear in mind the factors mentioned, but also the conditions of life of the patients. In soldiers there is an enforced constriction of the chest which may predispose to aortic degeneration. In other walks of life a man's duties may require him to assume positions which may react upon the vessels of the chest.

It is necessary to remember that aneurysmal degeneration is usually of late development, although it may occur early and during the secondary period.

PHLEBITIS.

The veins are attacked by syphilis in much the same way that the arteries are, in both the secondary and tertiary stages.

One or many veins may be attacked simultaneously or in succession.

The lesion consists of phlebitis or periphlebitis, and cases are on record in which the saphenous, crural, cephalic, and basilic veins were attacked. The large veins of the extremities, particularly the legs, are in some instances involved.

The vessel is found to be much swollen, firm, and cord-like. It may be the seat of slight pain, and rarely there are symptoms of acute inflammation. In many cases only a few inches of the vein are involved, but the whole continuity of the vessel may be attacked.

GANGRENE AND GANGRENOUS ULCERS.

In some cases of syphilis, as a result of the changes in the coats of arteries and veins, gangrene is produced, and portions of the integument and of the extremities are destroyed.

Until within recent years all ulcerations occurring in syphilitic subjects were regarded as evidences of the breaking down of specific infiltrations. To-day we clearly recognize the fact that spontaneous gangrene of the skin and its resulting ulcers may be due to syphilitic arteritis or to endarteritis obliterans.

This degenerative condition usually begins in individuals of poor nutrition, in those who are debilitated in consequence of bad regimen or excesses, and in subjects who have not been properly treated and who live in squalor.

The first evidence of syphilitic cutaneous gangrene is a mottling, with perhaps some scaling of the skin. The color changes to a greenish-brown, and finally becomes blackish-brown. In some cases the resulting eschar is soft and succulent; in others it is tough, dry, and withered. Very soon separation occurs at the base and the periphery of the lesion, and in a few days or a week or two the slough falls out, and a deep punched-out ulcer with an uneven, anfractuous, and dirty surface is left. The surrounding skin may be red and œdematous.

In some cases there is local pain; in others want of sensibility and coldness of the parts are complained of.

The vessels of the extremities are the ones most commonly attacked.

Several cases have been published in which symmetrical gangrene of the fingers (the so-called "Raynaud's disease") has been observed in syphilitic subjects.

CHAPTER XLVII.

SYPHILITIC AFFECTIONS OF THE NERVOUS SYSTEM.

SYPHILITIC nervous affections may be developed as early as the sixth month and as late as the twentieth year after infection. They are seen more frequently in men than in women, and are most common between the ages of twenty and thirty, simply because syphilis is most likely to be contracted at this period of life.

Syphilis does not primarily attack the cells of the nervous system, but begins in the vessels and connective tissues of these structures. The brain is more frequently attacked than the spinal cord. Our knowledge of the effect of syphilis upon the cerebellum is as yet rather limited.

The prominence and constancy of some of the nervous disorders of syphilis enable us to recognize them as distinct affections—namely, subacute meningitis, hemiplegia, epilepsy, paraplegia, and aphasia, and certain others of minor importance.

PREDISPOSING CAUSES OF SYPHILIS OF THE NERVOUS SYSTEM.

Nervous symptoms are especially likely to appear in persons of a neurotic or neuropathic constitution, which may be hereditary or acquired. Chorea, migraine, apoplexy, melancholy, and neuralgia are common features in the family history of such individuals. Those who have previously had some simple nervous affection are particularly liable, when infected by syphilis, to the development of specific nervous symptoms. Protracted mental anxiety and strain, depressing emotions, sexual excesses, the abuse of alcohol and of narcotics, have been known to act as predisposing causes. Of diseases, those accompanied or followed by cerebral congestion, also malaria and other conditions producing cachexia, may act indirectly. Sunstroke and injuries of the skull may be included, as well as the gouty diathesis, particularly in elderly persons and in those in whom gouty cerebral symptoms have been prominent.

The inadequacy or the absence of treatment in relation to the invasion of the nerve-centres by syphilis should be observed. In reading the histories of cases thus far reported it is found that in many no treatment at all had been attempted, in some the treatment had been insufficient, while in very few had it been carried on vigorously.

The nervous phenomena of syphilis generally originate in lesions

developed in one or more of the following structures: the cranial bones and vertebræ, the dura mater, the arachnoid and pia mater, the brain and cord, the arteries, the nerves.

The Bones.

Any lesion seated on the inner surface of the cranium or vertebræ may excite inflammation of the membranes, and may finally lead to morbid changes in the brain itself and in the spinal cord. The most frequent lesions are nodes, exostoses, caries, and necrosis.

The Dura Mater.

The dura mater, being a fibrous membrane, is peculiarly susceptible to the syphilitic poison. The changes, which usually consist of thickening due to increased cell-growth, roughening of the inner surface of the membrane, and abdominal vascularity, are generally not striking. In some cases the membrane has a brownish-red color and gelatinous appearance, but its structure remains firm.

The extent of the tissue involved and the amount of thickening vary, but are generally considerable.

The dura mater may be exclusively affected, or the disease may invade the inner table of the skull and the arachnoid, or the dura mater may be secondarily affected by processes beginning in the arachnoid and pia mater. In the case of nodes of the inner table the dura mater is found thickened and abnormally adherent.

The syphiloma may form a circumscribed tumor or may be diffused over a large area.

The portion of the membranes enveloping the brain is more often involved than that covering other parts. There may be but one focus of disease or several; in the latter case they are, as a rule, unsymmetrical.

Syphilomata of the spinal dura mater have an origin and pursue a course similar to those of the cerebral.

The Arachnoid and Pia Mater.

In simple hyperæmia of the pia mater the arachnoid may not be involved, but when the process advances to cell-proliferation it is impossible to demonstrate a line of demarcation between the two membranes.

In most cases the lesions of these membranes consists of congestion and visible enlargement of the vessels, followed by increase of connective tissue and consequent thickening; but sometimes gummatous infiltration supervenes, constituting a gummous meningitis.

More or less change in the subjacent nervous tissue always follows, and the [illegible] dura mater and the cranial bones.

Th[illegible]ent syphilitic nervous lesion. It is

found in single or multiple patches, distinctly circumscribed, of round or oval shape, and of various sizes.

When multiple, the patches are scattered irregularly, most frequently at the base, in the anterior and middle fossæ, less frequently on the convexity of the brain, seldom on the cord and medulla, and exceptionally on the cerebellum.

The Brain and Cord.

The changes in the brain and cord are always secondary to lesions of the bones, of the meninges, or of the vessels, and consist of two kinds of softening, the red and the white, which are similar to these lesions when non-specific.

The softening is likely to be more superficial when the lesion begins in the meninges than when it originates in the bones.

A primary vascular lesion on the basal surface will produce much more serious and extensive structural change in the brain than one at the vortex, for the reason that in the latter situation the vessels anastomose freely, whereas in the former each vessel is distributed to a region which has no other source of nutrition.

The Arteries.

The changes which syphilis produces in the vessels have been described (see page 490 *et seq.*).

The arteries most frequently involved are the large vessels at the base of the brain, and, for reasons already given, the danger to an extensive portion of the cerebral mass from defective nutrition is much greater than in disease of arteries distributed to the convexity.

The morbid change is rarely confined to a segment of the artery, but usually involves its entire circumference, and generally from an inch to an inch and a half of its continuity. Several vessels may be involved in different stages of the lesion or only one may be affected.

In advanced stages of the morbid process the vessel is found to be thickened, rigid, and slightly compressible, and may even have a nodulated appearance, due to excessive cellular development and invasion of the outer tunics at certain points. A thickened artery of small size may present several rounded expansions within the limit of an inch.

The Nerves.

The *cerebrospinal* nerves may be involved in the various affections of the meninges; they may be encircled by gummy tumors; or they may be compressed by swellings of the bony foramina. The resulting symptoms are anæsthesia, hyperæsthesia, analgesia, neuralgia, paralysis, or disturbances of the special senses.

Syphilitic lesions being most frequent in the neighborhood of the interpeduncular space, the nerves near this region are most commonly involved. The third pair are perhaps most often affected, the first, second, fourth, and sixth quite frequently, while syphilitic changes of the seventh pair, or facial nerves, are rather exceptional.

We know, as yet, little of the morbid changes caused by syphilis in the peripheral nerves, but certain clinical facts indicate that neuritis and multiple neuritis occur in the course of syphilis, as they do in that of other infectious diseases.

The *sympathetic* nerves may undergo two varieties of change—one affecting the nerve-cells and characterized by pigmentary and colloid degeneration; the other consisting of a connective-tissue proliferation.

SYPHILITIC TUMORS OF THE NERVOUS SYSTEM.

Two forms of syphiloma, or syphilitic tumor, are found in the cranio-vertebral cavity which differ widely in gross appearances, but are composed of similar structural elements. These tumors are usually connected with the cerebrum; they have rarely been found in the medulla oblongata or in the cord, but chiefly on the inferior surface of the brain, in the region of the fissure of Sylvius.

These tumors vary greatly in number and in size; there may be a single one or the surface of the hemisphere may be studded with large numbers of them, resembling the condition in miliary tuberculosis; they may be of the size of a pea or of a small walnut. They are usually round or oval, but in some situations they become flattened.

HEMIPLEGIA.

One of the most frequent phenomena of cerebral syphilis is hemiplegia, which may occur as early as the third month or as late as twenty years after infection. The interference with the motor function may be slight or there may be complete loss of power. It is generally preceded by a stage in which a prominent symptom is localized headache, often associated with many of the other symptoms already mentioned, such as mental disturbance, hebetude, vertigo, and convulsions, which are often immediately followed by the paralytic stroke.

In some cases muscular spasm, a form of preparalytic chorea, has been observed in the limbs afterward paralyzed. For instance, the arm may be jerked in various directions, or the patient may find it impossible to place the foot firmly on the ground, the leg being jerked suddenly from under him when he attempts to stand. In other cases darting pains are felt in the leg or arms, or constant neuralgic pain may exist in some part of the limb, or there may be numbness or tingling in the hands and feet, with areas of hyperæsthesia or anæsthesia.

In cases of gradual invasion total paralysis seldom occurs. The patient first notices that he is losing strength, perhaps in his fingers, so that he finds himself unable to button his clothing or to hold a pen firmly. This condition may continue until paralysis comes on, or it may be intermittent, the normal strength returning at intervals. When the leg is thus affected the patient naturally has more or less difficulty in walking. Complete hemiplegia may come on in this gradual manner, but is generally sudden in onset. Sometimes the leg is affected several hours before power is lost in the arm. The reverse, however, is infrequent. Patients are usually attacked with hemiplegia when engaged in some act of muscular effort, such as pulling on the boots, walking briskly, reaching for some object, or on the point of shooting at game. On the contrary, the attack may happen during the night, and the patient be unable to rise from bed in the morning.

The **course** and **duration** of hemiplegia vary greatly. When partial the paralysis may gradually improve, and even disappear spontaneously in a few days; or, as improvement takes place, the opposite side may be similarly affected, followed by recurrence of the paralysis on the side first involved. These cases are accompanied by excessive mental impairment, and, as a rule, have an early fatal termination. Syphilitic hemiplegia is caused by lesions of the arteries, and in cases of the latter class the vessels of both sides of the brain are implicated.

Disturbance of general sensation is usually limited, but instances of slight loss of motor power, with complete loss of the sensory function, have been reported. In exceptional cases there may be total loss of both motion and sensation.

A great variety of phenomena, depending upon the extent and situation of the lesions, may accompany syphilitic hemiplegia, such as paralysis of various nerves, aphasia, mydriasis, optic neuritis, and epilepsy. Mental depression seems to be constant, and most patients either display a condition of complete hebetude or are excessively emotional.

Though early and energetic treatment may accomplish the relief and even the cure of hemiplegia, the **prognosis** is greatly influenced by the age and extent of the lesion. The arteries arising from the circle of Willis supply the most important regions of the brain, and are most frequently affected by syphilis; obviously if but one artery is involved the prognosis is more favorable than if many are attacked. The number and gravity of the symptoms will usually give an idea of the extent of the lesion. In a simple case of hemiplegia probably only one or two vessels are affected, and complete recovery may take place; but when other symptoms indicative of extensive disorganization of the brain are present the prognosis is less favorable. As a rule, perfect health is in no case restored, although the patient may present no conspicuous ill-

ness. We may say, however, that the prognosis in syphilitic hemiplegia is better than in the simple form.

Diagnosis.—Syphilitic hemiplegia usually occurs much earlier in life than the simple variety, which is not commonly seen before the age of forty years. It should be remembered, therefore, that syphilis is the cause of most of the cases of hemiplegia in the young and middle-aged. The fact that a patient rarely loses consciousness when attacked by syphilitic hemiplegia is an additional diagnostic point of importance.

EPILEPSY.

This is of frequent occurrence in cerebral syphilis, and, like non-specific epilepsy, presents two forms, the *grand mal* and the *petit mal.* Headache, increasing in severity, always precedes an attack. The symptoms of the severe form are similar to those of the non-specific variety, consisting of sudden loss of consciousness, tonic followed by clonic spasms, facial distortion, foaming at the mouth, and stertorous respiration. According to some authors, the epileptic aura and cry are absent. Such convulsions occur at intervals, and frequently with regularity every ten days or once a month. Instances of their regular occurrence in the evening and at night have been reported; but, as a rule, they come on at no definite time. In some cases consciousness returns in a few minutes; in others the patient remains in a stupid condition for hours, and may not be fully restored for several days. After the seizure the headache may be much less severe for a time, but unless treatment is adopted its intensity soon returns.

The **course** of syphilitic epilepsy is uncertain, and may be greatly modified by treatment.

When convulsions follow a long prodromal stage in which symptoms of mental disturbance have been particularly severe, the **prognosis** is rather unfavorable; cases in which they follow a short period of headache generally yield to proper treatment. Tonic spasms may precede or follow an attack of hemiplegia, and are often seen in connection with permanent or intermittent aphasia. They are generally caused by pachymeningitis, though probably in some cases, as claimed by Jackson, irritation from a gumma is the exciting cause.

The intervals of syphilitic epilepsy, unlike those of apparent health in the simple form, are marked by symptoms of mental disturbance, which tend to increase, and may end in dementia.

The mild form, called by Charcot partial syphilitic epilepsy, may exist independently or combined with the severe form. The paroxysm may begin either with a twitching of one side of the face; a turning of the tongue to one side; a tendency on the part of the patient to whirl around; extreme giddiness; general trembling, or great weakness or

cramps of the extremities, which is followed by loss of consciousness and a convulsion consisting either of slight muscular tremor or of general tonic spasm. The seizure may be limited to a single limb or to one side of the body, and in some cases only amounts to slight rigidity. The severity and length of the attack are much less than in the *grand mal.*

Frequently there is no convulsion, but the patient, while talking or performing any act, becomes unconscious and is seen to stare vacantly. If sitting, he becomes motionless; if walking, he does not fall, but proceeds in an aimless manner; and if in the midst of conversation, he suddenly becomes obtuse and fails to comprehend questions addressed to him. While in this condition, which may last only a few seconds or as long as twenty minutes, he may perform rational acts, such as paying properly for a purchased article, or he may even walk without staggering, and when his senses are restored he may recall indistinctly or not at all what he has said or done.

The diagnostic points of syphilitic epilepsy are—1, the history of the patient; 2, the paroxysmal headache; 3, the frequency of mental disturbance; 4, the frequent coexistence of optic neuritis, hemiplegia, aphasia, and paralyses of various nerves; 5, the age of the patient; 6, the result of treatment.

Simple epilepsy is usually developed before puberty, whereas that caused by syphilis generally occurs between the ages of twenty and thirty, the period when syphilis is most frequently contracted. The former is either uninfluenced or aggravated by iodide of potassium and mercurials, whereas the influence of these drugs on the latter is favorable and in some cases curative.

PARAPLEGIA.

Though the spinal cord is attacked by syphilis less frequently than the brain, at least one-half the cases of paraplegia are of syphilitic origin.

The **symptoms** are not strongly marked. The patient, who may suffer from pain in the back, notices slight weakness of the lower extremities, and may also complain of one or more of the following symptoms: darting pains and spasms in the legs; numbness, tickling, or aching pains in the feet; hyperæsthesia, anæsthesia, dermatalgia, and formication. Loss of co-ordinating power may be observed. There is usually progressive weakness in the expulsive power of the rectum and bladder. This condition may remain stationary for a long time or it may improve temporarily, but unless treatment is adopted complete paralysis of both legs finally ensues. On the other hand, the development of paraplegia may be much more rapid.

General sensation may be preserved slightly impaired or wholly lost. Exceptionally it is destroyed while the motor function remains perfect. After the establishment of complete paralysis there may be short intervals of slightly restored power, or jerking of the muscles may be present.

Paraplegia may be the only manifestation of syphilis existing at this time, but frequently there are evidences of lesions in the brain, such as headache, vertigo, mental impairment, paralysis of one or more cranial nerves, particularly those supplying the muscles of the eyes, or optic neuritis. Mydriasis has also been observed. The presence of any of these latter symptoms confirms the diagnosis of syphilis, which is ordinarily less clear in this than in other nervous affections of specific origin. Careful inquiry into the history and age of the patient is demanded. Simple idiopathic paraplegia generally occurs later in life than the syphilitic form; and the latter, like all specific nervous affections, is greatly influenced and frequently cured by treatment, which should be adopted early in all cases, even in those of doubtful character.

The **prognosis**, unless treatment has been long delayed, is favorable.

The **causes** of syphilitic paraplegia are lesions of the vertebræ, of the spinal meninges, and tumors, which by pressure on the cord lead to myelitis and softening.

Cases thus far observed indicate that paraplegia is a later manifestation of syphilis than hemiplegia and epilepsy, though probably the lesions which cause it may be developed as early as within the first year of infection. In the majority of recorded cases its invasion has occurred after the sixth year of infection. It may, of course, occur much later.

APHASIA.

Various disturbances of speech, included under the term "aphasia," frequently occur in the course of syphilis of the nervous system. These may consist merely of hesitation in speaking, called *embarras de parole*, or of inability to remember certain words in writing and in speaking, or of the use of utterly inappropriate words on all occasions.

Syphilitic aphasia may be continuous or intermittent, and always accompanies other symptoms which determine its origin, since it presents in itself no diagnostic features.

The **prognosis** depends to a great extent upon the early adoption of antisyphilitic treatment.

LOCOMOTOR ATAXIA.

Investigations made within recent years clearly show that in 60 or 70 per cent. of cases of locomotor ataxia the patients had suffered more or less remotely from syphilis. This affection is due to connective-

tissue increase in the neuroglia, which is so commonly caused by syphilis.

The syphilitic form of this disorder is similar in its clinical history to, and is as rebellious to treatment as, the simple form.

CHOREA.

The spasmodic muscular movements caused by syphilis are irregular and occasional, and never constitute true chorea. Preparalytic chorea, characterized by spasmodic contractions without loss of consciousness, preceding an attack of hemiplegia or paraplegia, has been referred to; similar contractions not infrequently follow these paralyses, and the condition is then called post-paralytic chorea.

The spasms vary in intensity from a mere twitch to a decided convulsion, and may be limited to an arm, or may at the same time include the face, or they may occur unilaterally in the arm and the leg. They do not, as a rule, become general, and always coexist with other symptoms of graver import.

DEMENTIA.

Syphilis produces a morbid mental condition which consists of an association of intellectual, sensory, and motor disturbances, evidenced by numerous and complex symptoms. The intellectual disorder is indicated by cerebral excitement and exaltation of ideas with incoherence, and by gayness of spirits alternating with hebetude, together with delirium and even mania. The motor disturbances are well marked, and consist of uncertain movements without paralysis, trembling, and imperfect prehensile power of the hands, sudden loss of equilibrium, imperfect co-ordination, staggering gait, and hesitating speech. Besides these, there are frequently special affections, such as trembling of muscles and partial paralysis, ephemeral or persistent, and also certain symptoms of cerebral congestion; of the latter may be mentioned a sense of weight and pain in the head, dizziness, sudden dazzling sensations, vertigo, and various impairments of sight and hearing; to these should be added epileptic and epileptiform convulsions and sudden seizures of an apoplectic character. Of course, we never meet with all the above symptoms in combination, but in all cases many of them are associated.

The peculiarities of syphilitic dementia are that the paralytic symptoms predominate; that symptoms appear in a capricious and irregular manner, fibrillary contractions of the facial and lingual muscles being absent; that there are no well-defined exalted ideas; and that behind all there is a syphilitic cachexia.

Treatment.—It may be well here to emphasize the point that in the

treatment of syphilitic nervous affections, particularly those occurring within the early years of the infection, we must not place our whole trust in the iodide of potassium and ignore mercury. This latter agent is sometimes invaluable in these cases. By its use, together with that of the iodide, it will in many cases not be necessary to give the latter drug in such large doses as has sometimes been done. Mercurial ointment inunctions and hypodermic injections of the bichloride of mercury are in many cases of signal benefit. Iodide of potassium internally and mercury locally applied should not be forgotten in brain, medullary, and neuritic syphilis. It is important in the treatment of cases of cerebral syphilis that the mercurial ointment should be rubbed, if possible, upon the neck or upper portions of the body, in order to act upon the lymphatic system as near as possible to the brain. With care and attention to the local reaction which the inunctions may induce (but not necessarily), the region of the neck, and even the scalp, may be utilized for sufficiently long periods to insure amelioration of the symptoms.

Not only in cases of syphilitic meningeal lesions, but also in those of arterial degeneration, of extensive and localized paralyses, epilepsy, dementia, and of the various syphilitic neuralgias, will this combination treatment prove beneficial, and very often be followed by the most prompt and brilliant results. The regional use of the inunctions is, in my judgment, a great aid in promptness of cure.

The early onset of symptoms referable to the cerebrospinal system in many instances necessitates the early use of the iodide of potassium.

Syphilitic headaches will frequently be found very persistent and rebellious to treatment when mercury is given by the mouth. In some few cases calomel, in doses of $\frac{1}{6}$ or $\frac{1}{4}$ grain every three or four hours, may prove beneficial, but the danger of salivation is always to be feared if its use is prolonged. Mercurial inunctions into the neck and temples will usually prove very beneficial, and synchronously iodide of potassium in increasing doses should be given.

Iodide of potassium may be taken in milk, or in Vichy water, and in cases of weak stomach may be combined with Fairchild's essence of pepsin, and also with bitter tonics. In some cases a dose of 30 grains three or four times a day will have the desired effect. In obstinate cases, however, the remedy must be pushed until amelioration in the condition is produced or the obstinacy of the case shows that such disorganization has been produced by the syphilitic process that further improvement is hopeless. As much as $1\frac{1}{2}$ ounces daily have been required in many cases to produce a ure.

Besides the treatment here outlined, medication directed to concomitant and consecutive symptoms and conditions will be required, and should be instituted according to the indications presented.

CHAPTER XLVIII.

THE GENERAL METHODICAL TREATMENT OF SYPHILIS.

No statement can be made with more emphasis or with a greater foundation of truth than that the proper time to begin systematic medication in syphilis is the date at which general manifestations show themselves. There is no advantage or possible benefit lost to the patient by withholding mercury until the onset of the second stage, nor is the patient thereby put in jeopardy, present or future, nor are his chances for ultimate permanent cure in any way impaired. On the other hand, syphilis will be more orderly and conspicuously more amenable to treatment, and his physician will not grope in the dark, and will, if he promptly attacks the disease in the conservative but vigorous manner soon to be detailed, be spared the doubt and uncertainty of mind which are the inevitable lot of those who treat the disease prematurely. Then, again, when a patient sees convincing proof that he is syphilitic he usually persists in following treatment until he is pronounced cured.

The date, therefore (as a general rule), at which the treatment of syphilis should be begun is that at which the disease gives evidence of the general infection of the economy—namely, as soon as the generalized rash appears, together with the other manifold symptoms of the secondary period. Exceptions to this rule sometimes present themselves in cases where chancres interfere with the function of important organs; when their continued presence renders other persons liable to infection; when marital relations and exigencies render the removal of the initial lesion imperative; or when syphilis is contracted in the early weeks of pregnancy.

If the patient is under observation during the course of the chancre, much can be done for him in advance by the surgeon. At this time he can be prepared, if necessary, for the coming ordeal by a preparatory tonic course; or, if there are indications of gastro-intestinal impairment or debility, measures to remedy them may be instituted. Then, again, in this period, if there are very much swollen lymphatics or ganglia (and they will be found in association with the chancre), a well-directed external regional treatment may be followed. To this end plasters of mercurial ointment spread upon lint may be used. This regional treatment will have no perceptible effect upon the general development of the infection. At this time also the condition of the

mouth, gums, teeth, and pharynx should be inquired into, and these parts should be put as nearly as possible into a condition of health.

Before putting a patient upon general antisyphilitic treatment it is well for the physician to place before him certain facts as to his condition and his duties, and to forecast for him, as far as possible or prudent, his future pathological balance-sheet, so that he may know clearly what he has to do, what he has to fear, and what he may expect. With the onset of secondary syphilis a most important and eventful epoch in the life of the patient begins, and much can be done for him by a little kindliness and common sense. The physician should impress upon the patient the gravity of his disease and prepare him for the ordeal which is in store for him. He must be made to understand, in a gentle, kindly manner, that the ensuing two years at least are the most critically momentous ones in his whole life, and that his future health and happiness, and those of his family, depend upon his care of himself during this trying epoch. It is cruel and unnecessary to paint a dismal and lugubrious picture to these patients, or by word or manner to depress or discourage them. We are in the position, as a result of advanced therapeutics, to speak encouragingly and even brightly of their future, and to hold out to them the assurance that the ordeal of treatment will not be irksome or painful, and that a cure is in store for them. We can tell our patients truthfully that two or two and a half years of careful, methodical, watchful treatment will be, if they but conform to its regulations, sufficient to cure them of their disease. As a result of treatment they will see the syphilitic lesions disappear and fail to return, they will enter into a period of health in which there are no signs whatever of syphilis about them, and they will thus remain and will possess the power of procreating healthy children. The requirements for this gratifying state and for this future immunity are a fairly good state of health previous to infection, docility and loyalty of the patient to his physician, and a treatment begun sufficiently early and carried out in a watchful, thorough manner. This is the tripod upon which his future happiness rests. In the treatment of syphilis the duties of the physician and patient are reciprocal. While, therefore, in the majority of cases, particularly those of the intelligent and well-to-do classes, we are warranted in giving a hopeful and satisfactory prognosis, there are cases in which, under most favorable circumstances, the progress toward cure is slow, often disappointing and halting, and attended with much discomfort, debility, and illness. But even in these cases, trying and often discouraging alike to the patient and the physician, there is usually no necessity for doubt or despair, since with the rich therapeutic armamentarium at our command we are enabled to adapt ourselves to urgent necessities, exigencies, and emergencies, and

even to cope with formidable crises. In his early interviews with a syphilitic patient it is the duty of the physician to make a careful study of the man, to acquaint himself with his temperament, his standard of health and vitality, his power of resistance to disease and bodily strain —in fact, his mental and physical stamina, modes of life, tendencies, habits, and surroundings, and his duties, obligations, cares, and responsibilities—since from such a study much valuable knowledge is gained.

It must always be remembered that weakly, cachectic persons of poor fibre; flabby subjects; those who may be classed generally as underweight individuals; persons with very light and sandy complexion; those suffering from rheumatic, gouty, tuberculous, neurotic, malarious, or other adynamic conditions or influences; those having visceral disease of any kind or any inherited or acquired morbid tendency; and particularly persons addicted to alcoholic indulgences—are liable to suffer more or less severely from syphilis, and that in such cases the prognosis is less favorable and a longer time for cure may be required.

Besides its specific poison, syphilis tends in many cases to produce in the economy anæmia, cachexia, and even a condition of marasmus. Though there are some patients in whom it does not produce debility, and who seem as well as they ever were, we must always be on the lookout for its depressing effects upon the system. Therefore the first rule to be laid down in the treatment of syphilis is that the hygiene, regimen, and surroundings of the patient shall be made as nearly as possible perfect. The diet must be simple, ample, and nourishing, and the patient's habits as to eating, drinking, and sleeping should be regular and systematic. All health-giving sources of recreation and exercise should be made use of, and every attention should be given to maintaining the health and vitality of the patient at as high a plane as possible. Therefore patients must be warned against overtaxing themselves physically or mentally, or in any way putting themselves on a strain. The physician should always be watchful, particularly in the treatment of patients of the higher classes, about the mental wear and tear to which so many are liable. In such cases syphilis is very prone to produce cerebral and mental disturbances.

While, in general, abstinence from alcoholic drinks is to be recommended for syphilitic patients, it is always well to exercise wholesome common sense in dealing with this question. Many authors go to an extreme in claiming that syphilitics should become total abstainers. The ordeal of the syphilitic is not as a rule a very happy one, and the less we surround him with irritating restrictions the more docile will he be in the long run in following treatment. Therefore I think that a man who by habit partakes moderately of claret or burgundy or other mild stimulant at his chief meal, and who enjoys it and is seemingly none

the worse for it, should not generally be deprived of it. Then, again, there are patients who partake in moderation of ale and beer, and who are to their thinking benefited thereby. Provided these stimulants do not disorder the stomach, they can hardly be called deleterious; therefore their use should not be abruptly interdicted. On the other hand, indulgence in strong alcoholic drinks and champagnes must be peremptorily stopped. Nothing is more galling to patients, according to my experience, than a treadmill treatment which surrounds them with all sorts of restrictions and imposes upon them blue-law abstinence. The plan which works best in the long run in handling syphilitics is that which, compatible with their well-being, gives them most latitude and revolutionizes their habits and modes of life as little as possible. To sum up, alcohol should only be used by syphilitic patients in great moderation and under conditions which tend to improve their strength and digestion.

It is almost unnecessary to say that excessive sexual indulgence are depressing and exhausting and that they are to be avoided. Very many cases of cerebral and nervous syphilis have their origin in sexual excess, and many men have become infirm or have perished from such overindulgence while suffering from syphilis. As to tobacco, we can hardly speak with the same latitude and tolerance as we can of alcohol in syphilis. Smoking and chewing, even in mild indulgence, are so prone to induce irritation and inflammation of the mouth and throat, which it is so vitally necessary to keep in a high state of health, that we are forced, as a rule, absolutely to prohibit them. It requires, very often, considerable moral courage to deny the touching appeal of a patient to be allowed one or two cigars a day, but we must in general stand firm. Still, there are cases, happily for them, in which, despite syphilis and its treatment, irritation of the mouth and throat is not produced, and such patients may perhaps, under observation, indulge their favorite habit. Wherever the use of tobacco produces even mild hyperæmia of the mouth and throat it should be strictly forbidden.

All functional derangements or affections of internal organs—stomach, intestines, liver, spleen, kidneys, etc.—should be carefully attended to. Patients prone to pulmonary affections, and those having a tendency to rheumatism and gout, should be warned in advance to observe great care in the avoidance of the causes which are liable to light up or develop these dormant tendencies. In like manner, neuropathic subjects, and those suffering from any hereditary or acquired cerebral or nervous trouble, should be made carefully but impressively to understand that the nervous system is their weak part, and that while they are in the grip of syphilis they must be more than ordinarily careful not to overtax it nor to abuse it.

It is very important that the changes of the seasons and weather should be met with appropriate clothing, and that the utmost precaution should be taken against catching cold.

While the physician should thus impress the patient with the gravity of his condition, he should also constantly hold out to him that most consoling hope, that he will, in all probability, be free from his disease. While some patients are calm and sensible, and others light-hearted and indifferent to their physical condition, others, again—happily not many—show a tendency to worry, fret, and solicitude, or even to a depression of spirits and melancholy which is termed syphilophobia—a most distressing state of mind both for the patient and his physician. Such cases should be treated with constant encouragement and kindness mingled with firmness; their doubts should be dispelled, their fears should be allayed, and bright hopes should be held out to them. By such a course many a rough spot will be made smooth, and many a man will be auspiciously brought through his syphilis who otherwise would have faltered or have fallen by the wayside.

With the onset of the generalized manifestations of syphilis at the beginning of the secondary period the regular methodical treatment should be commenced. At this time and at short intervals thereafter the patient should be carefully examined as to the condition of his skin and its appendages, of his mouth and throat, and lymphatic system generally. Taking for an example a case of roseola with its usual concomitants of slight fever, malaise, and perhaps nocturnal headaches or rheumatoid pains, we should immediately put the patient upon treatment by the mouth. Later on the inunction method may be employed, but as a rule pills are quite effective, particularly in the very early secondary stage. While intelligent patients will usually submit willingly to inunction treatment later on, its adoption at the very outset is liable to be irksome, and to give them the idea that they have a very trying and unpleasant ordeal before them. Though many preparations of mercury are employed, my preference is for the protoiodide, thymoloacetate, and tannate when the drug is given in pill-form. Calomel and blue pill are usually not satisfactory agents. Calomel is very liable to salivate promptly, and its action is far from certain; and as to blue pill, it may be said that when given in small doses its antisyphilitic effect is very feeble, though it may act upon the liver, and when it is given in sufficient quantity one never knows how soon severe salivation may be induced. Bichloride of mercury very commonly produces pain in the chest and bowels and gastro-intestinal irritation. Then, again, its action cannot be relied upon, for in small doses by the stomach it does little if any good, and in large doses it is very irritating. Its action when used hypodermically is, however, very

efficient and satisfactory, and its local action in the form of lotions and ointments is very prompt and beneficial. Within recent years the carbolate, salicylate, alanilate, and other preparations of mercury have been vaunted as possessing marked potentiality, but when put to the test they are found to possess no advantage over the drugs I have named.

Since every case of syphilis is a law unto itself as to the amount of mercury which will be required for its cure, we can only state the doses approximately. For an adult, male or female, a quarter or a third of a grain of the protoiodide may be given at a dose, of which three a day will be sufficient. Very large and robust persons may require one-half of a grain at a dose. These are always suitable doses to begin with, and by them the tolerance of the drug may be gauged and its remedial action estimated.

In the early secondary stage there are certain conditions favorable to an active treatment—namely, a system virgin to mercurial action and a greater susceptibility of the lesions to the action of mercury. This, then, is the most favorable time for efficient treatment, and it is the most critical one in the life of the syphilitic, for if the disease is actively attacked then its backbone may be broken. It is very probable that much of the late rebelliousness and malignity of syphilis is due to the fact that the newly formed infecting granulation-cells and the concomitant subacute inflammation induce in organs and tissues, particularly delicate ones, structural and nutritive changes which predispose them to subsequent low grades of inflammation and cell-increase; besides, to a repetition of the essential syphilitic process. Therefore every effort should be made to destroy these young infectious cells, and to remove them as quickly as possible from the parenchyma of organs and tissues, before they shall have had time to induce these subtle and dangerous structural changes. In proportion as a systematic and vigorous mercurial course is entered upon late, so it is less effectual in its action. There is no doubt whatever in my mind that a mercurial treatment covering the first six months of the disease is far more salutary and effective than a course extending over a year or more instituted later on.

It is important, therefore, that the initial course should be active and prolonged, and in attaining this end the case must be carefully handled and watched. As a rule, the physician can form a correct estimate as to the probable effect of mercury upon his patient within a week or ten days. In most cases the dose of the protoiodide may be increased within a few days to one grain or one grain and a half, and even to a larger quantity. It is rarely necessary to give more three grains of the potoiodide in a day, and most cases will

about two grains, or even less. The tannate of mercury is a very active drug, which, from a large experience, I have come to place much confidence in. It is not as mild as has been claimed, and cannot (as has been implied) be used with impunity. In some cases it causes gastro-intestinal irritation and severe salivation. Its initial dose is half a grain taken three times a day.

In combination with the mercurial preparation we may employ a ferruginous or bitter tonic, and as an adjuvant we may add a sedative agent to calm the intestinal canal. I think a note of warning should be raised against the combination of preparations of opium in antisyphilitic remedies. There is really no need for them, and much harm may be done by their continued use in producing an habituation to the drug, with all its deleterious effects upon the nervous system, the digestive organs, and the tissues generally. We can never determine the exact condition of a patient under mercurial treatment who is also under the influence of opium. As a general rule, in stomach ingestion mercury, if carefully given, causes little trouble. It may produce diarrhœa and colicky pains for a day or two, which a little essence of ginger or peppermint will relieve, or it may be necessary to omit one or two more doses. In general, if patients are careful about their food and do not take too much fluid into their stomachs, the mercurial will after the first disturbance cause no irritation.

Citrate of iron and quinine as a tonic, and extract of hyoscyamus as a sedative, may be used in combination with the protoiodide in pill-form. In a general way the indications for the treatment of the secondary stage of syphilis, in the first six months, are as follows: to administer mercury by the mouth at once, and thus continue for three or four weeks; then either gradually or abruptly to substitute the inunction method. Having found that inunctions produce a good effect, they should be continued according to the indications of the case. Some patients can receive with benefit and no discomfort twenty or thirty consecutive daily inunctions; others can stand only one such rubbing every second or third day. In the event of the necessity of using inunctions less frequently than every day or every second day, it is well to administer mercury by the mouth in the intervals. In many cases, even in early syphilis, it is often wise to discontinue either the pills or the inunctions for one or more weeks, during which time the combinations of a mercurial salt and iodide of potassium known as the mixed treatment may be administered. (See page 680.)

The iodide of potassium is certainly very efficient in ridding the system of the toxins produced by syphilis; hence its use in alternation with active internal mercurialization in the first six months of syphilis is urgently called for.

In some cases iodide of potassium becomes the mainstay of treatment in early syphilis. These cases are those in which there is early development of cerebral symptoms—severe headaches, epilepsy, hemiplegia, aphasia, and dementia. The early supervention of osseous and articular lesions, the occurrence of epididymitis or orchitis, precocious affections of the ear and eye, and swelling of the spleen and liver should all be combated with a combined iodide and mercurial treatment. In like manner, the precocious development of cutaneous gummata and gummatous infiltration into mucous membranes (particularly of the mouth and pharynx) indicates the necessity of local mercurialization when practicable and the internal use of the iodide of potassium. In some cases of rheumatoid pains and early rheumatism it may be necessary to use the iodide quite early.

The criteria which indicate that treatment is efficient should be carefully studied. If the patient looks and feels well, sleeps soundly, eats heartily, holds his accustomed weight, and is mentally and physically in a satisfactory condition, there is strong evidence that he is being benefited. But we must further assure ourselves that the lesions are being acted upon. The indurated nodule must have wholly disappeared, the lymphatic engorgement must show evident signs of involution, and the rash must have faded. The throat and mouth must be inspected very often, and any red patches or ulcerative lesions should be actively treated. In like manner papular and pustular lesions in hairy parts should be treated locally. Painful spots and swellings upon bones or near or at joints, thickening of the fasciæ and subcutaneous connective tissues, should receive regional treatment. In like manner, in cases of headaches, neuralgias, rheumatoid pains of muscles, eye and ear affections, affections of the hairs and nails, the mercurial medication should be brought as near as possible to the morbid area. It is also advisable to watch for and act promptly upon red scaling patches and papules seated upon the palms and the soles, since they are very persistent. Any swellings and hyperplasiæ about the mouth or face, vulva, anus, and scrotum should receive suitable local treatment.

While in general the initial course of treatment, occupying six months if possible, should consist mainly of medication by the mouth or by inunction, the physician should be watchful of all complications and developments, should be on the lookout for all drawbacks and dangers, and should be ever prompt and ready with such modifications of treatment, such expedients, and such reserve measures of aid as the case may demand.

In most cases a continuous mercurial course of six months may be pursued without experiencing any serious drawbacks if the patient be properly watched. There may be periods of a few days in which it

is necessary to suspend medicine and either leave the stomach at rest or give tonics. But, as a rule, this early period offers a golden opportunity. It is our duty to avail ourselves of the then existing favorable condition of the system to assimilate mercury. In rare cases mercury taken by the stomach acts as a general depressant and the patient's nutrition is impaired. These grave drawbacks and seeming contraindications may be promptly dispelled by the employment of hypodermic injections of the bichloride of mercury. In such cases it is well to begin with a moderate dose, and then work upward as fast as we can.

While a patient is undergoing this mercurial course he should have one or two baths each week on going to bed, in order to produce diaphoresis. When practicable he should take Turkish baths, without the cold plunge, and after them should be made to sweat freely. At the seaside cold salt-water baths are very beneficial, and an occasional hot sea-water bath, followed by packing and a sweat, is a valuable adjuvant to mercurial treatment.

In cases, particularly uncomplicated ones, well treated from the beginning there are usually no perceptible secondary or tertiary stages. The secondary stage is entered upon, the disease is systematically attacked, and, excepting, perhaps, a few ephemeral and trifling manifestations upon the skin or mucous membrane (and they are largely produced by extraneous irritation, friction, coaptation of parts, want of cleanliness, smoking, etc.), he or she sees no further development. Still, some cases are rebellious, and tax our resources and patience, and some —happily few—go badly from the start.

Having administered efficient medication, with few and short interruptions, for about six months, it is safe to say that in most cases, particularly uncomplicated ones, the patient will be well on his way to recovery.

If the condition of the patient is satisfactory, as shown by the absence of all lesions, by almost entire subsidence of the lymphatic ganglia, by a good condition of his nutrition and strength, and by the absence of symptoms pointing to nervous depression and debility, at the end of six months he may have a rest, the moral effect of which will be very salutary. Patients very often weary of the long-continued dosing, and in the interval of repose they cease to consider themselves sick, and have an opportunity to judge of their condition when they are free from the effect of drugs. Therefore, a month's cessation of medication should be granted, and, if possible, the patient should go to the seaside or the mountains and have an entire change of air and scene. It is not uncommon, however, to see patients who do not desire a period of freedom from medication, but persist in carrying on the treatment.

On resuming the treatment my preference is to begin a systematic inunction course. In cases in which this is impracticable or for any reason contraindicated, I have come to look with much favor upon a combination of a full dose of mercury with a small dose of the iodide of potassium. The following prescription will illustrate my meaning:

℞.	Hydrarg. biniodidi,	gr. ij to iv;
	Potassii iodidi,	ʒss;
	Tr. cinchonæ comp.,	℥iiiss;
	Aquæ,	℥ss.—M.

Sig. One teaspoonful three times a day, an hour after eating, in a wine-glassful of water.

In this prescription the mercurial is the efficient agent, and the iodide simply serves the purpose of rendering it soluble. When there is debility the fluid extract of coca may be added. From a wide experience I have convinced myself that this mixture of mercury and iodide of potassium is remarkably efficient and beneficial after the sixth or eighth month of the secondary period, particularly in cases which have been previously subjected to treatment. This combination is usually well borne by the stomach even when the maximum quantity of the biniodide is ordered. But great care must be observed in its administration, and if gastro-intestinal irritation is produced the dose must be made smaller; and if a depressing effect upon the general nutrition or upon the nervous system is observed, the remedy must for a time be suspended. In these cases rest and change of air and scene are very beneficial.

The second course of treatment may be kept up, with or without slight interruptions, for three or four months, or even longer if the patient shows no signs of deterioration of health referable to the treatment. During this second course inunctions also may be used, with proper intervals of rest, or fumigations may be employed, according to the indications of the case. There may be reasons which render a course of hypodermic injections of sublimate preferable. In this way the first year passes, during which the patient will have been under dosage treatment nine or ten months.

Toward the end of the first year, if not before, combinations of mercury with iodide of potassium in quite large doses are very often beneficial. The use of these combinations is generally known as the "mixed treatment." The follo[illegible] are of much value:

℞. Hydrarg. biniodidi,	gr. j–ij;
Potassii iodidi,	℥ss–℥j;
Syr. aurantii cort.,	℥iij;
Aquæ,	℥j.—M.

Sig. One teaspoonful three times a day, an hour after eating, in a wine-glassful of water.

℞. Hydrarg. bichloridi,	gr. j–ij–iij;
Potassii iodidi,	℥ss–℥j–℥iss;
Tr. cinchonæ comp.,	℥iiss;
Aquæ,	℥ss.—M.

To be taken in the same manner as the foregoing.

The combination of the inunction-treatment with iodide of potassium taken internally is often very beneficial indeed, and should be employed in late secondary and tertiary lesions, particularly when localized to certain regions, which should be acted upon directly by the mercurial ointment. The simultaneous employment of hypodermic injections of a mercurial salt with the ingestion of iodide of potassium is sometimes productive of prompt and marked benefit. As a rule, the foregoing combinations are very useful toward the end of the first year of syphilis, but in many cases having an unusual course, and chiefly those in which late lesions appear precociously, it may be necessary to resort to them at an earlier date. It is always necessary to watch the condition of the stomach when the mixed treatment is being employed or when large doses of the iodide are administered. As soon as signs of gastric irritation show themselves the remedy must be suspended, and, if necessary, symptomatic treatment should be adopted. The iodide alone or in combination may act as a depressant upon nutrition and upon the nervous system. In these cases it may be necessary to reduce the dose or to intermit the treatment.

In the carrying out of the methodical general treatment of syphilis in the second year of the disease the periods of dosage may, on an average, be stated at two to three months, with intervals of rest of a month or six weeks. In this way about eight months are required for actual medication. In most cases at the end of the second year of thorough treatment patients may be pronounced cured, provided they have not for many months shown evidence of the disease, that their lymphatic system appears healthy, and their general health and nutrition are good. Though there is a disposition on the part of those who rely chiefly on mouth-medication to extend the treatment of syphilis indefinitely, I see no reason whatever for altering the opinion that I have many time stated, that if an energetic and thorough treatment

(such as I have sketched) be followed for two years or two years and a half, the patient will be cured, as shown by the enjoyment of good health, by freedom from syphilitic manifestations, and by his or her ability to procreate healthy children. In some cases this auspicious result may be the outcome of treatment by pills, but in most it will only be attained by the zealous and intelligent employment of inunctions, supplemented by other methods and by the use of the iodide.

For some cases of late secondary and early tertiary lesions of the skin, particularly when attended with scaling, Donovan's solution—liquor arsenii et hydrargyri iodidi—is sometimes beneficial. The dose is 5 to 10 drops, given in a bitter tincture and well diluted with water, an hour after eating.

Decoctions and infusions of such vegetables as sarsaparilla, yellow dock, saponaria, stillingia, and others have long been held in high esteem by the laity for the treatment of syphilis. They have absolutely no antisyphilitic influence, and if they are beneficial at all, the effect is due to their influence as tonics, stomachics, diuretics, or diaphoretics. They may be beneficial as adjuvants to mercury and iodide of potassium.

In Germany and in America Zittman's decoction is used in old, obstinate cases of syphilis when the usual remedies are badly if at all borne, and when the physician is at his wits' end to know what to do. In many very unpromising cases I have seen beneficial, and even striking, results; hence this remedy should be kept in mind.

As an adjuvant in the treatment of syphilis the fluid extract of coca is a very valuable agent. It is in no sense a specific, and its beneficial action consists in its marked tonic effect upon the heart, capillaries, and nervous system, and upon nutrition in general. In anæmia and cachexia and in the adynamic condition occasionally induced by mercury and iodide of potassium it sometimes works wonders. In some cases I have seen it induce a condition of receptivity by which mercury, which at first was badly borne, became tolerated and curative. In malignant precocious syphilis it acts well by improving the general nutrition. It is very often beneficial to patients addicted to alcoholics, and it may then take the place of those stimulants.

Preparations of iron, quinine, and strychnine are also very beneficial adjuvants.

Thyroid extract in full doses has been reported as being very beneficial in a number of cases of tertiary syphilis in which there was great cachexia. Hypodermic injections of the blood-serum of animals and of the serum of syphilitics have been used in the treatment of secondary and tertiary syphilis, but in all instances they utterly failed.

It may be stated as a broad general rule that when cases come under treatment after the disease has existed for several months, they should

be placed at once upon the inunction method. This course is partic larly to be followed when the patient presents a more or less gene eruption. In these cases we very often cannot bring sufficient mercu to act upon the surface of the skin through the medium of the bloo circulation, and it is a waste of time and effort to make the patie swallow pills. In all cases in which treatment is begun rather la the physician should be particularly careful to try, as far as possible, exert a prompt and efficient influence upon the disease, and to keep the treatment for (as a rule) six months without much interruption. this way he may be able to make up for lost time, which is so essenti In these untreated cases mercurial fumigations, hypodermic injectio and the combined use of mercurials with iodide of potassium are oft productive of marked benefit.

Late secondary and tertiary lesions of the skin and mucous me brane, affections of the bones, periosteum, and joints, late-appeari affections of the eye, ear, and cerebrospinal system, of the viscera, a of the testes and penis, require a combination or mixed treatment. many cases it is necessary to increase the dose of the iodide far beyo those mentioned, sometimes to the extent of one or two ounces a day.

It must be remembered that the arbitrary rule laid down by son authors, that early in syphilis mercury is indicated, and that later the iodide alone should be given, is not, in general, a good one. Mar cases of tertiary syphilis have remained unaffected by the use of t iodide alone, and have promptly improved and soon recovered after me cury also was given. The use of mercury, therefore, should not limited to the secondary stage, but should also be employed in tertia syphilis, either by inunction or hypodermic injection or fumigation combined with the iodide given internally.

It will be generally found that patients who have followed a sy tematic and thorough course of treatment during the first year rare present tertiary lesions. The cases which present these graver di orders are usually those which have been the subject of complic tions in the secondary stage, or those in which an early efficient trea ment has not been followed or has been indifferently followed. Patien presenting tertiary lesions should be actively treated, but at the san time close attention must be paid to their general condition, for many of them nutrition is impaired and a condition of cachexia exis

It is necessary now to consider the facts concerning the mercuri inunction method, mercurial fumigations, hypodermic mercurial i jections, and thermal baths.

THE INUNCTION METHOD.

Most patients will submit to this method when its great advantages are clearly presented to them. During this treatment the patient must observe good hygienic régime; he should avoid taking cold and exercise care as to his diet.

The most reliable and efficient preparation of mercury for the inunction-cure is the officinal mercurial or blue ointment—unguentum hydrargyri—of a strength of 50 per cent., as a rule. It is most important that this preparation shall be well made and perfectly fresh. It is not sufficient simply to order the blue ointment, but the patient should be impressed with the necessity of obtaining a perfectly pure preparation, and should be particularly instructed to purchase it of only reliable apothecaries who frequently renew their stock. Many instances of irritation of the skin are due solely to the rancidity of the ointment rubbed in. The matter of the dose should be carefully looked after, so that absolute precision is obtained.

For general practice the average dose of blue ointment may be stated at from 45 to 60 grains, a larger dose being used upon robust and well-developed patients, and a smaller one upon those of thin and flabby structure. The early rubbings are largely tentative, with a view of gauging the patient and the dose. The inunction-treatment should never be begun in a careless manner. The case being a suitable one, two or three frictions of 30 grains each may be tried and the effect watched. Some patients bear these inunctions when of generous quantity with remarkable tolerance for very long periods; others, again, show evidence contraindicating their use after three to six rubbings. Therefore, the physician should have his patient well in hand, and watch him very carefully every day or two until he has been under the treatment for at least two or three weeks. As the frictions are given and benefit is evident, the dose may be increased to 60 or 90 grains of the ointment; and in general, for regular routine treatment this quantity will be found ample, but in emergencies and exigencies a larger quantity will be required. While the patient is under this treatment (the general and special condition being favorable) the physician must watch and question him, to learn that he feels stronger and even gains weight, which is very common when this treatment is beneficial, and is really one of the first signs of improvement; that his strength is satisfactory; that his appetite is good and digestion perfect; that he has no elevations or oscillations of temperature; that he sleeps well at night and awakes refreshed; and that he is not troubled with even slight, nervous symptoms. If, in short, a man shows signs of doing well, and has no mouth, stomach, or intestinal troubles, and it is

evident that his general condition is being improved, the physicia may know that he is on the right track, and should go ahead, bu should always be on the lookout for the mouth and the gastro intestinal tract. When mercury is thus introduced through the skin it is thought that it enters not by the lungs, but by way of the swea hair, and sebaceous follicles, into the lymph-spaces, and then become albuminized and ready for absorption. We then have the stomach fre for food, tonics, or the iodide of potassium, if it is indicated. Thus w may improve digestion and nutrition by agents, such as iron, quinine strychnine, coca, hypophosphites, etc. This coincident tonic course i often very beneficial in improving the condition of the syphiliticall affected tissues, and in rendering them more amenable to the specifi action of the mercury. In this connection it is to be prominently re membered that a decided tonic action is produced by generous, nutritiou diet, which does so much to engraft upon the tissues the power of re sistance to the syphilitic poison.

When the patient undergoes the frictions at home he must first hav a local or general bath. As a rule in city life, the inunctions are of neces sity taken in the evening, whereas at health resorts it is well that the should be taken in the morning. The home patient may take a bat at a temperature of 96° to 98° F., after which he should be well rubbe with a towel. When possible, in warm weather one or two Turkis baths a week may be taken in alternation with the regular baths. Bu of these baths the physician must be very watchful, and if they in an way tend to debilitate the patient, who under the circumstances sleep poorly and awakes unrefreshed, stiff, and weak, they should be discon tinued. Under these circumstances, and when it is impossible to hav bathing facilities, the part to be anointed should be carefully washed wit warm water and soap, and then sponged with a 2 or 3 per cent. solu tion of carbolic acid. This latter application should also always b used after the general bath. By strict attention to the aseptic conditio of the skin we can almost always avoid dermal inflammatory compli cations. When it is urgently necessary to treat parts covered with hai they may be clipped, or even shaved, and then thoroughly washed wit the carbolic solution. Upon parts sparsely supplied with hairs gre care should be taken that an aseptic condition be produced. B the observance of care many unpleasant complications may b avoided.

It is always best that the inunctions should be made by a profe sional rubber or a trained nurse, if possible. If, owing to circum stances, the patient must be his own rubber, he should be made clearl to understand the technic. In the first place, the physician must se that the dose is made precise, and if the ointment is put up in packe

of oiled paper allowance must be made for the loss occasioned by the adherence of some of the ointment.

The ointment should be divided into several portions, and each one should be firmly rubbed into the skin, employing the two palms when the anatomical arrangement of the parts will admit of it. Combined with the friction, a moderate amount of massage may be practised. In this way all the ointment must be rubbed in, so that no lumps are left; the surface of the skin will then look as if it had been lightly pot-leaded. As a general rule, from twenty to thirty minutes are necessary for an inunction. After this operation suitable night-clothes should be put on to protect the bed-linen, and the patient should retire. When the preliminary general bath cannot be taken, it is well to let the patient drink directly after the rubbing a pint or more of fresh hot milk, and then cover himself well with blankets in order to induce perspiration. According to his case and to the whim of the patient, hot lemonade or hot tea (and in some cases a little brandy, whiskey, or gin may be added) may be taken to produce diaphoresis after the inunction.

It is well to divide the body into eleven subdivisions, each of which is to be submitted to its own mercurial friction. They are as follows:

1. The neck and head.

2 and 3. The arms, palms, and axillæ.

4 and 5. The legs and soles.

6 and 7. The thighs, with groins and Scarpa's triangle.

8 and 9. The breast and abdomen.

10 and 11. The back from the root of the neck to lower part of the gluteal region.

In non-hairy persons there is little trouble in anointing the neck. In those whose necks are densely covered with hair we may be forced to confine the inunctions to the parts not covered. In urgent cases and where the lesions are copious it is necessary to have the hair clipped or shaved. If there are scalp lesions or any in the beard, an ointment composed of white precipitate (30 grains) and vaseline (1 ounce) may be used freely. In this case it may be well to make the regular dose of mercurial ointment used elsewhere on the neck smaller. Prior to rubbing the ointment into the scalp and beard shampoos and antiseptic lotions should be used.

It is important that the whole surface of the arms should be acted upon in a vigorous manner. If there are any lesions of the palms, these parts should receive careful attention, and in any case it is well to anoint them several times during the treatment. It is most important to bring the ointment into contact with the contents of the axillæ; and this can be done with impunity, provided care is taken that the parts are rendered aseptic.

The legs and the soles should be well rubbed with both hands, and any lesions upon the latter parts should receive especial attention. In like manner the thighs should be treated, and the groins and the surface over Scarpa's triangle should be firmly rubbed for a sufficient time. If the ganglia in the groins are much swollen, it may be necessary to apply a layer of mercurial ointment on lint or one of the mercurial plasters. Care need not be taken to keep the ointment from the scrotum.

Sometimes the inunctions produce irritation upon the breast and abdomen, and the method is pursued with difficulty. Under these circumstances all means toward the avoidance of dermatitis and follicular inflammation should be adopted.

Patients rarely have any difficulty in administering to themselves inunctions upon the buttocks, but it is impossible for them to reach their backs. Therefore it is necessary to get outside aid, which in most cases I have found possible. By this method the whole body is treated in eleven séances. In many cases, when we use from 45 to 60 grains of the ointment for each rubbing, we can give the whole series of eleven on successive days. But, as I have said before, we can never be positive that we can do so; therefore the patient must be watched and questioned each day as to his condition. In this way we feel our way, and continue or suspend the inunctions as the indications of the case teach us.

In giving a regular treatment by inunctions it is well to omit them for a few days according to the indications, and then to go over the same ground again. In a systematic treatment we may give fifty to eighty, or even a hundred, inunctions with proper intermissions, and then it is well to desist for a short or long time. In ordinary cases, where the inunction method is used as a regular mode of treatment, it may or may not be necessary to administer the iodide of potassium at the same time. In most cases it will not be necessary to employ a large dose of this salt. But in old and untreated cases it will be necessary to use stronger doses of the ointment, perhaps employ them more frequently, and combine them with large doses of the iodide, given internally.

It sometimes happens that we desire to keep up a mild mercurial action, and the circumstances of the patient will not admit of the employment of frictions. In these cases the ointment may be spread upon a canton-flannel belt, which may be worn around the body. In cases of enlargement of the spleen, tenderness over the liver, with or without jaundice, pain in the chest (pleuritic or resembling angina pectoris), and in swollen and painful joints, these mercurial bandages may be employed with much benefit. This method is also useful in the treatment of syphilitic infants and children.

Though the inunction treatment is uniformly potent and beneficial, it has its drawbacks and complications. These are—1, dermatitis and follicular inflammation; 2, stomatitis and salivation; 3, digestive disturbances and intestinal complications; 4, sleeplessness; 5, inanition and exhaustion; 6, tendency to congestion of the head, heart, and lungs; 7, tendency to fever and perspiration; 8, pain in bones and joints. Though this list looks rather formidable, in actual practice the cases are few in which it is necessary to abandon the treatment or in which modifications and expedients fail to smooth matters over. In some cases a short suspension of the treatment may set matters right, while in others a temporary diminution of the quantity of the ointment effects the same purpose.

It sometimes happens that a patient is unable to employ a professional rubber, and is indisposed to the physical exertion incident to the inunction-method. In these circumstances the ointment may be quite freely spread over the chest and shoulders and arms and there left. It is claimed that the heat of the body volatilizes the mercury, and that it enters the system through the lungs.

MERCURIAL FUMIGATION.

The mercurial vapor-bath is a method of treating syphilis which is useful in very many cases and in many conditions of syphilis—not as a routine treatment, but as one of reserve and exigency.

Mercurial baths are useful during the whole secondary stage of syphilis, and also in the tertiary period. They may be employed to remove some obstinate local lesion or to expedite the disappearance of a general rash. Late secondary rashes rebellious to other methods are frequently dispelled by this with promptitude. Neuralgias, rheumatoid pains, cephalalgias, pains in joints and fasciæ are often promptly relieved by mercurial baths. In cases in which for any reason other methods of treatment are contraindicated we may resort to mercurial fumigations with marked benefit.

Many preparations of mercury have been used in this form of treatment, but calomel and cinnabar are the agents upon which experience has shown that most reliance may be placed. To obtain good and satisfactory results these drugs must be pure and free from admixture.

When calomel is used, from 40 to 60 grains may be placed upon the lamp, but in some cases even 90 grains may be required. The large doses of calomel administered with moist vapor are generally used in cases of severity and of exigency, and are not to be frequently repeated. Cinnabar may be used in somewhat larger quantity than calomel, but in general my practice is to combine the two salts in one bath. As an average dose I have found that 20 grains of calomel and

40 of cinnabar fused simultaneously in connection with moist heat p duce prompt and safe results. This dose may be increased or diminis according to the condition of the case. In large cities there are usu one or more establishments in which these baths are given under advice of physicians. In that case the physician need only presci the dose and the number of baths which he desires the patient to ta and the bath attendants will carry out his wishes.

When the baths are unobtainable or when the patients object visit the bath establishment, this method may be pursued at ho For this purpose it is necessary to use either Lee's or Maury's la by means of which the mercurial salt is volatilized and steam genera at the same time. The patient is stripped and enveloped in one more blankets or in coverings made for the purpose of mackintosh India-rubber lined with flannel, and the flame started. In a f minutes perspiration is induced, and the evaporated calomel is deposi upon the body. Usually the protective garments fit closely at the ne but in some there is a slight opening, through which some of the fu may escape and may be absorbed in respiration. When deemed nec sary by the physician, the patient may inhale some of the fumes, but i always well to allow some air. Twenty to thirty minutes are suffici for a bath, after which the patient is allowed to cool off slowly. Wh practicable the patient should retire at once to bed, preferably envelo in the garment worn during the bath. It is well, if the patient has dress and go home, that as little friction of the skin as possible sho be practised, in order not to rub off the minute particles of mercu In cold weather care should be taken that the patient is properly p tected when he goes out after the bath.

These baths should never be taken directly after meals. It is bet that they should, if possible, be taken just before going to bed or the evening; but in any case fully two hours should elapse after a me As a rule, patients should be in good condition as to their stomachs a bowels when they are subjected to this treatment, and they must rigidly prohibited from using alcoholics. While undergoing mercu vapor treatment the patient should be carefully watched in order that drawbacks may be encountered. Thus if he complains of feeling ti and debilitated after a bath, it will be necessary to reduce the quant of mercury and also the amount of water to be evaporated. In ma cases harm is done by using too much steam vapor. Some patients co plain of headache, and it is then necessary to administer a purge or decrease the amount of food ingested.

It is well to begin by giving one bath every other day, and then increase to a bath daily if the necessity of the case demands it. So patients bear these daily baths well, while others experience unpleas

symptoms from them. As a rule, after one or two baths improvement is observed, but in some cases a beneficial effect is delayed for a week or two. The number of baths to be taken can only be determined by the condition of the case. In general it may be said that a course of baths extending over one or two months will be sufficient. This period, however, may be lengthened. In many cases only a few baths are necessary, they being employed for some temporary condition or as an adjuvant to other methods of treatment.

While a patient is thus being treated the physician should carefully watch the state of his gums and of the gastro-intestinal tract, and remedy any disturbance. It is not uncommon to observe a mild form of mouth lesions in patients taking a course of mercurial baths. This condition may be cured by local means and by the temporary suspension of the baths or by diminishing the quantity of the mercurial employed. Sometimes, when large doses have been frequently used, a sudden and violent colitis is developed. This condition, painful and sometimes alarming, is readily cured by rest, cessation of treatment, and the use of opiates.

HYPODERMIC INJECTIONS OF MERCURY.

Although all the preparations of mercury, both soluble and insoluble, have been used hypodermically in the treatment of syphilis, but one of them, the bichloride, has stood the test of time. Whereas in earlier days the claim was made that this treatment was applicable to all forms and stages of syphilis, the conviction has gained ground that it is a method (valuable in very many instances) of reserve, emergency, utility, or expediency. Thus in cases in which mercury is badly borne by the stomach, and acts as a depressant and impairs nutrition, it is common to observe that these injections are well borne, and that an era of improvement is inaugurated. Again, in cases of intestinal disorder, in which pain and diarrhœa always follow the stomach-dose, subcutaneous injections are beneficial. In many cases when by stomach ingestion a mild or severe stomatitis or salivation is produced, or when local medication is without effect, the substitution of hypodermic injections will often be followed by toleration of the drug. The injections are often of much value in local and regional therapy, as, for instance, in cases of localized syphilitic neoplasms, resisting internal treatment, in eye, ear, and cerebral affections, and in hyperplasia of the lymphatics and the ganglia. In the past few years I have observed much benefit from the hypodermic injection of corrosive sublimate in patients who were suffering from la grippe, and in whom the secondary manifestations of syphilis were coincidently present. In many of these cases mercury by the stomach was badly borne and produced debility and great nervousness; in others

the stomach was fully taxed by the antigrip remedies; and in still others it seemed to have no effect. In these conditions I resorted to the sublimate injections, with a promptly beneficial effect and ultimate good results upon the syphilitic diathesis. It is well to bear these facts in mind, for they will be the means of helping many a sorely tried patient.

In many cases of secondary syphilis it will happen that by reason of colds, of intercurrent acute affections of the throat, lungs, liver, and intestines, and of gastric derangements, mercury by the mouth is temporarily contraindicated; and in these exigencies resort may be had to hypodermic medication. Patients sometimes become tired and complain of the dosing by pills, and circumstances do not favor the use of inunctions or fumigations; in these cases very often quiet and contentment may be produced by using mercury subcutaneously. In some cases—happily rare—the evolution of the secondary stage of syphilis is ushered in with fever and marked debility and malaise; in fact, a pseudotyphoid state is produced. In such cases there is very often stomach intolerance of mercury, and the patient is too weak to stand mercurial inunctions. In this emergency we can use hypodermic injections of sublimate with confidence, and employ the stomach for symptomatic remedies.

Within the limits of expediency, emergency, and utility these injections possess the advantages of smallness and precision of dose and ease of administration, a promptly satisfactory therapeutic action, and the absence of systemic disturbance.

Extended experience has convinced me that the most efficient dose of the bichloride when used hypodermically is $\frac{1}{4}$ of a grain, and it may in some cases be increased to even $\frac{5}{8}$ or $\frac{3}{4}$ of a grain. It is usually well to begin with the injection of $\frac{1}{8}$ of a grain, and to increase carefully up to $\frac{1}{4}$ of a grain, and, if necessary, even higher. In average well-developed men these doses are well borne, and will exert a favorable influence upon the disease and produce no bad results. In former years these doses would have been considered toxic, but I have given so many thousands of them with much benefit to patients, that I have reached the conclusion that it is only within the past few years that we have realized the full curative effect by this method.

The bichloride solution should be freshly made and so adjusted that 10 drops of distilled water will contain $\frac{1}{4}$ of a grain of the salt. This solution should be kept in a dark place.

Method of Injection.—The syringe should be made of India-rubber, and should hold 10 or 20 drops. The needles should be of very fine calibre, of steel, and fully an inch and one-eighth or one-quarter long. The greatest care should be taken to keep the syringe and needles (for it is well to have quite a number) in a state of perfect cleanliness and

removed from dust contamination. When the syringe is charged with the sublimate solution and the needle is affixed, the instrument should be placed in a saucer or tray containing a 5 per cent. carbolic acid solution. In the operation complete asepsis should be aimed at: the injected part should be carefully washed with soap and water, mopped with carbolic acid solution (5 per cent.), and dried. The skin being pinched up in a fold, the needle is to be pushed gently but firmly deep into the subcutaneous connective tissues, and the fluid expelled slowly and with care, in order that the tissues may not be bruised more than necessary. Slight massage over the site of injection will aid in its diffusion into the tissues. It must always be borne in mind that the fluid should not be thrown into the deep parts of the derma proper, for the reason that if there deposited it is very prone to produce an eschar, which will result in destruction of the whole thickness of the skin. Then, again, great care must be exercised that the point of the needle is not in a vein, in which case dizziness, syncope, a feeling of suffocation, pain in the heart and lungs, and other alarming symptoms will be observed. To avoid this accident the surgeon must watch the piston of the syringe while he is injecting. If there is a moderate resistance to the injected fluid, as will be the case if the tip is in the subcutaneous tissues, he may know that all is well. If, however, the injection seems to pass out of the syringe without any or with very little resistance, there is danger that the tip is in a vein. Under these circumstances it is well to push down farther or withdraw the needle a little until normal resistance is felt, and no untoward symptoms threaten. A very moderate amount of practice in the use of hypodermic injections will teach the surgeon to know when he is in danger of doing harm.

The depressions just behind the great trochanters are eligible sites for injections. Injections made here, as a rule, cause little if any pain, and but small and ephemeral nodosities, In this region quite a number of injections may be given, and in most instances sufficient surface is offered for the requisite injection-treatment. We can resort also to the hypogastric regions and to the parts near the inguinal lymphatics, above and below; but whenever the upper parts of the thighs are used great care must be exercised, in order that we can continue the treatment. As it is very often important to act locally upon lesions of the penis and of the lymphatics arising therefrom, we may have to utilize the tissues in their vicinity. It should always be remembered that injections should not be made into the mons veneris or under the skin of the penis. The region of the neck, particularly its back portions, may be used in extreme cases requiring local or regional therapy. Care must be exercised that vessels and nerves are not punctured or injured. Whenever mercurial injections are employed for localized deposits of

new growths the anatomical peculiarities of the parts must be taken in consideration.

As a rule, the injection of $\frac{1}{8}$ or $\frac{1}{4}$ of a grain of sublimate eve second day will not be attended with annoying results, and even a dai injection may be well borne and may produce good results. N absolute rule can be given as to the dose or its frequency. As h been said, each case is a problem, and when treated with inje tions, as with all methods of antisyphilitic therapy, it must be carefull watched. If the general condition of the patient is improved, if h lesions show signs of yielding to treatment, and if the annoyanc and discomforts of his disease are ameliorated, the physician ma be assured that he is on the right track, and he can increase th dose or the frequency of the injections according to the indicatio presented. It is astonishing how seldom stomatitis or intestin troubles are produced even when massive doses of the sublimate a injected.

The unpleasant local effects are as follows: pain at the point o puncture; pain at the site of the injection; an erythematous conditio of the skin, with heat and itching or burning; infiltration of th subcutaneous tissues, and localized firm nodosities.

The pain at the point of puncture is usually trifling, and abscess i seldom caused in this era of asepsis.

The pain at the site of injection may be severe, but as a rule it cease in a few hours. It may last one or more days, and leave a sensatio of tenderness and soreness of varying degrees. In many cases it wi be observed that pain is felt after the first few injections, and tha thereafter it is not complained of. The temperament of the patient i this ordeal, as in disease in general, has much to do with the presenc or absence of pain following injections.

An erythematous halo may often be observed even when the utmos care has been taken with the injection. As a rule, this hyperæmia i slight and ephemeral, and causes little annoyance. In some cases th redness is deep, and the burning and itching are severe. It is a con dition readily relieved by rest and cooling lotions.

Infiltration into the subcutaneous tissues may be of various grade of severity. In exceptional cases it presents many of the objectiv features of erythema nodosum. We may also find extensive induratio of a brawny character, which may or may not be painful. In som instances prompt involution occurs, but in others the thickened conditio is persistent. In some cases each injection gives rise to a localized mar ginated subcutaneous tumor which presents a feeling of firm structure These nodosities remain in an indolent condition for a time, and the disappear.

Abscesses, such as follow calomel injections, are not observed following sublimate injections.

Injection of mercurial salts into veins (a procedure recently exploited) is a very dangerous method, and should not be used. If the surgeon likes to wander into the field of experimentation, he may use other soluble mercurial salts—*i. e.*, the salicylate; but he will find in the end that none of them is better than the bichloride.

Calomel and other insoluble salts of mercury have been used hypodermically in the treatment of syphilis, but their use is attended by many dangers, local and constitutional. Calomel injections will sometimes produce excellent results, but such can also be obtained from the use of bichloride injections and by inunctions.

Calomel and other insoluble preparations of mercury when injected under the skin may produce intractable salivation, severe enteritis and colitis, intestinal ulceration, infarction of the lungs and parenchymatous nephritis, and anuria.

THERMAL SPRINGS AND BATHS.

The various hot springs of this and other countries do not possess any specific action whatever upon syphilis or upon syphilitic lesions. When patients go to these places they are, so to speak, on their good behavior, and they follow treatment regularly and lead a temperate and wholesome life. The warm and hot baths are beneficial in promoting metabolism, and the air and exercise alternating with rest and quiet have a decidedly beneficial effect. But all these conditions and benefits can be obtained in most country places and pleasure-resorts. In any country place and at the seaside patients can take more antisyphilitic medication than when at home, and this is the main feature insisted upon by those who advocate the various hot springs. In most cases the syphilitic who makes this long and tiresome pilgrimage has not been well treated at home; hence has not done well. So he seeks the relief which he thinks he can derive in some mysterious manner from thermal baths.

Take away mercurial ointment and iodide of potassium from any thermal spring, and its business will soon close up for want of patronage.

DRAWBACKS SOMETIMES EXPERIENCED DURING THE TREATMENT OF SYPHILIS.

Mouth and Nasopharynx.

During the administration of mercury, particularly when long continued and in large doses, salivation is liable to occur. This accident may be prevented by guardedly prescribing the dose and by continually

watching the patient. With the onset of salivation mercurial treatmen should be abruptly stopped, and local antiseptic and astringent remedie employed at once.

The most common symptom of mild salivation produced by mercury is a sensation of soreness in the gums, felt chiefly when cleaning the teeth, and also in mastication, or from contact with vinegar or othe acid fluids. Many patients first experience uneasiness and pain around one or both wisdom teeth. In either of these instances of gingivitis we find the gums red, swollen, and exulcerated, and perhaps at their teeth-margin covered with a film of necrotic tissue or membrane which consists of microbes and degenerated epithelial cells. In some cases this condition is confined to the interdental prominences of the mucous membrane; in others the entire gums are swollen, softened, and tender. Under these circumstances the teeth often feel tender, and even painful; they become loose, and the patient feels that they are longer than usual. In very severe cases they drop out. As concomitants of this state there is a metallic taste in the mouth and the breath is more or less fetid. Other patients first complain of a metallic taste in the mouth, and it will be noticed then that the breath is offensive, or before the supervention of these symptoms they may observe that the quantity of saliva is increased, and is more or less viscid. Inspection of the mouth then shows a general condition of œdematous hyperæmia. The gums and the mucous membrane of the cheeks, at the root of the tongue, and of the pharynx are of a deep-red or a whitish-red color. The submaxillary glands may be swollen and painful, and the parotid may likewise be affected. Unless the process ceases, either spontaneously or as a result of treatment, the swelling of the parts increases; the tongue swells; the mouth can with difficulty be opened, and then not to its full extent; the teeth make deep indentations in the mucous membrane of the cheeks, and ulcerations may occur. In these severe cases the suffering of the patient is very distressing, and deglutition is more or less impaired. The patient cannot chew or partake of solid food, and has to rely upon milk and nutritious liquids for sustenance. To add to his trouble, he becomes weak, nervous, restless, and apprehensive; he sleeps little, and has no comfort anywhere. His pallid, anxious facies, his immobile and perhaps swollen mouth and lips, together with the constant flow of viscid saliva and the fetid breath, present a truly pitiable spectacle. Luckily, we now-a-days seldom see these formidable cases of salivation.

The mouth-lesions produced by the use of mercury are certainly less common now than years ago. As a rule, most patients bear mercury well; others are at first moderately affected by it; while in a few cases its use in a short time produces toxic effects of greater or less severity.

There is no point deserving of greater emphasis in the treatment of syphilis than that it is most essential to keep the mouth and nasopharynx in a healthy condition. These cavities should be examined from time to time, and any inflammatory or otherwise abnormal condition should be treated at once.

Treatment of Gingivitis, Stomatitis, and Salivation.—A patient under mercurial treatment should be, as before stated, carefully watched as to the condition of his mouth, throat, and nose. When there is any tendency to hyperæmia of the mouth and throat, free rinsing three or four times a day with solutions of chlorate of potassium and alum, of common salt, or of borax should be employed. When patients are undergoing an inunction cure, particularly, it is well to wash the mouth three or four times a day with strong alum-water or with a solution of alum and acetate of lead.

The first signs of irritation of the gums indicate the necessity for a diminution of the dose or a suspension of treatment and the adoption of local therapeutics. In all cases of mercurial action upon the mouth the physician should be very conservative in the use of caustic applications. For mild cases of gingivitis the application with a brush of equal parts of tincture of myrrh and tincture of iodine once a day, followed by some mild mouth-wash, will usually be all-sufficient. When the case is severe, and the tissues of the mouth and throat are much inflamed and swollen, frequent rinsing with very warm solutions of borax and alum, to which listerine and glycerin are added, are very soothing. Once or twice a day it may be necessary to use as a mouth-wash and gargle a solution of the nitrate of silver (4 to 8 grains to the ounce). Much benefit often follows rinsing the mouth with a solution of bichloride of mercury. For this purpose Von Swieten's solution, either of full strength or diluted, will prove very efficacious. Patients thus suffering should be well nourished by means of nutritious broths and sarco-peptones, and should take quinine freely. They should be kept in the fresh air as much as possible. Much benefit and comfort may be derived from the application of a solution of cocaine to ulcerated surfaces. The judicious use of hot baths will aid in the elimination of the mercury from the system.

Intestinal Canal.

Many patients who have taken mercury, even in comparatively small quantities, for a long or even short period, begin to complain of symptoms referable to the stomach. They say that they have flatulence and sour stomach, and that their digestion is weak. In its early days this condition may not be accompanied by bodily weakness, but its continuance is complicated by general debility, pallor of countenance, indi-

position to exertion, and even a depression of the nervous system of such marked intensity that we may call it neurasthenia. This condition is also produced by combinations of mercury and iodide of potassium.

The most common form of disturbance of the intestinal canal due to the ingestion of mercury is a mild form of enteritis, which is attended with colicky pains, borborygmus, and diarrhœa. In many cases this condition is very ephemeral and passes away in a few days, during which the system is becoming accustomed to the action of the drug. The pain and disturbance are felt shortly after taking the dose, and last for an hour or more, and then pass off, to follow in like manner the next dose. In other cases the effect is more severe and lasting, and the patient becomes weak. To prevent this untoward action of mercury, the utmost care must be exercised in the matter of diet, which should be bland and easily digestible, and in the avoidance of large quantities of fluids and of alcoholic and malt liquors.

In some cases in which pills are taken, but chiefly in those in which inunctions, fumigations, and hypodermic injections are actively given, colitis of different degrees is produced. This condition is attended with much pain and discomfort, and with a diarrhœa which may be so severe as to be bloody. Under these circumstances the specific treatment must be temporarily suspended and the bowel affection treated symptomatically.

Mercurial Cachexia.

A general depression and impairment of the nutrition of the body sometimes occur quite early after the ingestion or absorption of mercury. But those cases in which it may be said that there is an intolerance to mercury are happily rare. In most of them it will be found that if the mercurial by the mouth be stopped, and its guarded use by inunction or hypodermic injection be substituted, the intolerance will cease, and that the drug will work satisfactorily.

As a result of greatly prolonged mercurialization, general debility and impaired nutrition of the body are frequently produced. In many of these cases the syphilitic diathesis is still active, new lesions appear, while old ones persist, and coincidently the patient begins to look pallid and sickly, to be weak and apathetic, and to suffer more or less from nervous depression. This condition is a frequent outcome of the continuous mercurial treatment, and is sometimes seen in persons who, fearful of the disease, have an insensate and irresistible desire continually to dose themselves with mercury. It is attended with dilatation of the stomach, gastro-enteritis of a mild and chronic type, perhaps colitis, and a general impairment of the nervous system and of the nutritional powers of the body. Under an enlightened

system of antisyphilitic therapeutics in its broadest sense such conditions as these can be readily avoided.

Toxic Effects of the Iodides.

Considering the large number of people, old and young, who for longer or shorter periods take iodide of potassium, it must be admitted that, in general, the remedy is well borne by the human system. There are, however, many with whom the drug disagrees more or less actively. These persons are said to have the iodide-of-potassium idiosyncrasy; that is, that in one way or another the drug produces unpleasant and even toxic effects in them, which are grouped under the general term iodism. We also read of iodide-of-potassium intolerance; but the truth is that the cases are exceptional in which the drug is so badly borne that its use has to be permanently suspended. While there are many persons who have a greater or less idiosyncrasy against the iodide, there are few who are wholly intolerant of its use.

There are many peculiar facts connected with the iodide idiosyncrasy. In some cases a small dose (a fractional part of a grain) will produce severe and even alarming effects, and we may be unable even by means of many expedients to overcome the intolerance. In other cases a very small dose will produce unpleasant and even severe effects, whereas a large one will be well borne, either at first or after several trials. In some cases I think that we (to use an apt expression) "weaken" too quickly, and give up the drug after a little rebuff; whereas with proper moral courage (the urgent necessity existing) we can increase the dose and, by persisting, establish toleration.

The toxic effects of iodide of potassium and of the other iodides may be mild or severe.

Slight or severe nausea and griping pains in the bowels may follow the ingestion of iodide of potassium. These can hardly be called toxic effects, however, for they are usually readily prevented by the addition of a little tincture of ginger or capsicum to the mixture, or of a small quantity of tannin.

The most common early symptom of iodism is a metallic taste in the mouth and throat, with sometimes fetor of the breath. Coryza, mild and severe, is also frequently complained of, and is often regarded by patients as cold in the head. There may be mild conjunctivitis and lachrymation combined with the coryza, which may be accompanied by much sneezing and irritation of the nose and eyes, and very often severe pain in the frontal sinuses. In some cases what is called iodide grip is observed. In these rare instances the upper air-passages, the eyes, and lachrymal ducts are much swollen and red. The face becomes swollen, and a red blush resembling erysipelas may be present. The

pharynx becomes red and swollen, and the œdema may extend to the epiglottis and glottis. The patient suffers much from burning sensations and pain, from dyspnœa, hoarseness, and dysphagia. Together with this formidable condition there are fever, weakness, pain in the head, extreme restlessness, and in rare cases œdema of the glottis.

In some cases salivation occurs, which, however, is not usually as severe as that due to mercury. In most cases it is of a mild and ephemeral character.

Neuralgic pains in the head or jaws are very frequently complained of, and some patients suffer from severe toothache while taking this drug. In other cases there is swelling of the parotid, submaxillary, and sublingual glands, which gives rise to very uncomfortable symptoms in the neck.

It is not uncommon to see œdematous hyperplasia of the soft palate, of the tissues around the root of the tongue, of the tongue itself, and of the pharynx in cases of acute or chronic iodism. This condition is very distressing and persistent, and demands prompt and efficient local treatment.

The toxic effects of the iodides, chiefly of potassium, upon the skin are very numerous and multiform in character. They may all be classed under the general head of dermatitis, of which we find a papular and papulopustular form (urticarial), tubercular, tuberous, nodular, bullous, and ulcerative. Besides the essential inflammatory dermal lesions, the iodides may produce purpura, probably from their defibrinizing effects upon the blood. In some cases iodide of potassium produces such rapid and feeble action of the heart that its use must be given up. It is very important that these iodine rashes shall not be diagnosticated as syphilides with acute exacerbation.

Though last to be mentioned, particular attention should be called to the gastro-intestinal effects and intolerance of the iodides, chiefly of the iodide of potassium. In most cases the stomach receives the drug kindly; in others it produces a feeling of discomfort and impairs digestion. This condition may soon pass off, either spontaneously or as the result of proper medication and alimentation. In other instances it is a very serious drawback, necessitating the suspension or even the abandonment of the drug. It is always well (the necessity existing) to use every possible means to overcome this troublesome complication. After the long use of full doses of the drug patients very often complain of distressing dyspeptic symptoms and of weakness, and show evidence of emaciation. Their heart-action may be weak and their nervous system profoundly affected. Indeed, a condition of cachexia, or even of neurasthenia, may thus be induced. In such cases we must stop the use of the drug at once, put the patients upon a careful regimen,

see that their hygiene is made satisfactory, build them up with tonics, and bring to their aid all fortifying influences.

It is said that long-continued use of the iodides may produce structural lesions of the kidney.

Iodide of rubidium has proved an inert remedy in the treatment of syphilis.

A number of new remedies, mostly patented and all widely advertised, have been vaunted as ideal substitutes for the classical mercurials and for iodide of potassium; but none of them has shown any reliable therapeutic effects.

CHAPTER XLIX.

HEREDITARY SYPHILIS.

THE words "congenital" and "infantile" are used to designate th variety of syphilis; the former lacks precision, and the latter may l applied with equal propriety to the hereditary and the acquired form: The term *hereditary syphilis*, therefore, seems preferable.

In earlier years when the treatment of syphilis was less efficier than it is now, the mortality of hereditarily syphilitic children wa very great; but of late years the deaths of these children have bee much less numerous and the course of this disease much less severe an prolonged. With the increased effectiveness of the treatment of th syphilis of the parents it is seen nowadays that in many cases the off spring escapes the infection or the disease is less severe than formerly It follows from these statements that the old-time frightful statistic concerning hereditary syphilis are now out of date and possess n scientific value.

The symptoms of hereditary syphilis show themselves in most case between the third and twelfth week after birth. In case of the infec tion of both parents having occurred just prior to conception, unle energetic treatment is adopted the fœtus may be profoundly affecte and die. In the event of only one parent being recently diseased, may be possible by prompt and energetic treatment of the moth to save the child from infection or at least to modify favorably i intensity.

There are few exceptions to the rule that the severity of the disea decreases with each succeeding child. The danger of the death of a infected child diminishes as it grows older, and freedom from sym toms until after the sixth month justifies a favorable prognosis. Dea results most frequently in cachectic children and from gastro-inte tinal affections, which are to a great extent dependent on visceı lesions.

Syphilis is transmitted only to the second generation; and althou several authors have claimed transmission to the third generation, t cases reported as showing the condition have failed utterly in carryi conviction to one's mind.

The course of hereditary syphilis differs in many respects from th of the acquired disease. The latter always begins, as we have seen, l

the development of a local lesion, which is followed by a definite secondary period of incubation, at the expiration of which constitutional manifestations appear, while the hereditary disease presents no initial lesion and cannot be divided into stages. Moreover, while many of the lesions of each are similar, being undoubtedly caused by the syphilitic poison, on the other hand, a large number of those in the hereditary form are merely the result of perverted nutrition, and may occur in any adynamic disease. Among such lesions may be classed certain affections of the eyes, peculiar osseous malformations, hydrocephalus, impaired growth of the hair, as well as deafness and deaf-mutism, the ultimate cause of which is unknown.

The lesions of hereditary syphilis are more hyperæmic and active than those of the acquired form, and tend to involve larger surfaces. As a rule, the early lesions are more generally distributed and are more symmetrical than those which are developed later.

Vesicular and bullous syphilides, so rare in acquired syphilis, are quite common in the hereditary form, while rupia is almost unknown in the latter. Affections of the nasal mucous membrane, which are infrequent and appear late in the former, are among the earliest and most reliable diagnostic symptoms of the hereditary disease. Visceral affections are much more common in the latter than in the former, frequently being multiple, and coexisting with lesions similar to those of the secondary stage of the acquired disease. Gummatous and connective-tissue infiltrations are often developed before birth, and are more diffuse and symmetrical when they appear before the end of the first year of life; when seen after that period they may present the characteristics of the acquired form. A peculiar and constant lesion of the ossifying ends of the long bones has been observed during the early months of hereditary syphilis. Certain bone-lesions may be developed at a later period which resemble those of the acquired disease. Affections of the nervous system, although more common than has been supposed, are comparatively rare in hereditary syphilis.

Evidences of hereditary taint usually disappear before puberty, although syphilitic lesions undoubtedly hereditary have been observed at later periods, and in some instances after years of apparent latency. The extent to which inherited syphilis furnishes immunity to the acquired form is still undetermined, but it is very probable that a child hereditarily syphilitic at birth may suffer a mild attack if he should be infected by syphilis acquired at puberty or later.

In hereditary syphilis, as in the acquired disease, the same tendency exists to the development of tuberculosis, and this dangerous symbiosis is always to be feared in infected children, old and young.

OUTLINE OF THE COURSE OF HEREDITARY SYPHILIS.

The **duration** of hereditary syphilis depends altogether upon two conditions—the intensity of the diathesis and the treatment. It is not uncommon for children to present mild and superficial symptoms for a few months or a year, and then become blooming and healthy, never again to be affected with syphilitic lesions. Again, severe and extensive lesions may be exhibited during the early months, which relapse at irregular intervals in an equally intense but more limited form for a few years; or syphilitic lesions may be developed from time to time until the tenth or twelfth year, perfect health being established after that time. In very chronic cases symptoms may recur more or less frequently until puberty. My observations lead me to the conclusion that they do not appear after that date. In general, the severity of hereditary syphilis is expended within the first few years, and subsequent lesions, although possibly extensive and deep, do not show the malignancy of early ones.

The **course** of hereditary syphilis is equally as chronic as that of the acquired disease, and is more irregular and uncertain, especially when the treatment has not been adequate and efficient. For this reason the lesions cannot be arranged in chronological order, and a precise division of the disease into stages is likewise impracticable. Visceral and superficial lesions frequently coexist; the interval between early and late lesions may be but a few months or even many years.

As in the acquired form, so in hereditary syphilis, the extensive superficial exanthems are peculiar to the first months of the disease. With these may coexist lesions of the mucous membranes, of the bones, or of the viscera. Relapsing syphilides are usually less extensive than the first eruption, and their lesions are less numerous. They may be composed of either papules, pustules, or vesicles, the eruption being polymorphous or made up of one variety of lesion. The course of these relapsing syphilides may be even more chronic than that of the first eruption, and the interval between the two may be a few weeks or several months. Sometimes the second rash appears before the complete disappearance of the first. It may be said that these relapses of general eruptions are, as a rule, peculiar to the first two or three years of the disease. Subsequent eruptions are of another order, more profound, more localized, and less likely to relapse. These later orders of dermal lesions may be papulotubercular or perhaps pustular, but in general they are tubercular, tuberculo-ulcerous, and gummatous.

These cases of late development are rather rare, although I have seen fully six dozen in which such lesions have appeared at the third, sixth, eighth, twelfth, fifteenth, and twentieth years. In fully one-half

they occurred between the fourth and twelfth years, in three-eighths between the third and fifth, and in the remainder between the twelfth and twentieth years. It is very rare to see dermal lesions extensive and superficial after the second or third year, they being usually profound and limited, and in this respect differing from those of the acquired disease. Under the heading of syphilis hereditaria tarda many interesting cases of dermal, osseous, visceral, and cerebrospinal lesions have been reported. In many cases, however, the history of syphilis is very vague. (See Fig. 161.)

FIG. 161.

Typical facies of a child suffering from hereditary syphilis, showing opacity of the cornea, fall of nose, with stenoses and the sequelæ of ulcers of mouth.

In the majority of cases the development of visceral lesions takes place in intra-uterine life, and their course after birth is retrogressive. The principal organs attacked are the liver, the lungs, the brain, and the kidneys. Our knowledge of the frequency and extent of their development after birth is incomplete. Besides the cutaneous and visceral lesions of the first year or two, other syphilitic affections are frequently observed. In many cases the diaphyso-epiphyseal lesions of the bones appear during intra-uterine life and run their course in the early months of the disease, possibly relapsing at a later period; or they may appear for the first time during the first year of life. From the fourth up to the twentieth year the shafts of the bones may be affected by periostitis, and joint-affections often occur.

The lesions of the mucous membrane are, like those of the s superficial and often extensive in the first years of life; at later per they are circumscribed, profound, and destructive. Occasionally ir choroiditis, or retinitis occurs, generally between the third and si years, while we observe that keratitis may appear at any time up to fifteenth or even twentieth year.

In the somewhat rare cases of hereditary syphilis presenting cerel and nervous symptoms, it has been noted that such symptoms and nu tional affections of the cranium, teeth, etc., begin in the early years life and leave more or less marked traces.

The severity of hereditary syphilis exhausts itself within the f three years of life; whatever symptoms are manifested after that t are developed in the most chronic and irregular manner. Therefore any division of the disease into stages were to be made, the first f years might be considered the first stage, or the period of the dise proper, the second stage extending from that time indefinitely, but beyond the twentieth year.

In considering these persistently recurring attacks of the vari forms of lesions one must always remember that with the advan now made in our therapeutics in many cases the syphilitic diatheses n be extinguished.

SOURCE OF THE INFECTION.

Infection of the child may be derived from the father alone or mother, or from both.

Influence of the Father.

So many undoubted instances of the transmission of syphilis fr father to child have been reported that further evidence is scare needed. The risk of contagion from the father is in proportion to t activity of his symptoms. If procreation takes place while he is in t first period of incubation, the child will escape, and may do so ev during the secondary period, but infection is more probable as the lat stage advances. Probably the malign influence begins with the evo tion of constitutional manifestations.

There is abundant evidence that if the disease is not treated t sperm-cells will retain the syphilitic virus through the first year, si temporary and spontaneous latency of the disease is observed only a later period. On the other hand, mercurial treatment may so modify t disease that the child will escape even within the first year. We frequent examples of this when men recently syphilitic and compell to marry are put under an active mercurial course, and within a y

become fathers of children who never show the slightest evidence of syphilis.

This paternal transmission is called germinative or spermatic infection; and if syphilis is really a disease due to a bacterium, we, guided by analogical evidence, can readily understand the nature of the process. As pointed out by von Düring, Pasteur's discovery that "the germs of the disease of silkworms, called pebrin, pass into the ovulum and into the spermatic cells of the infected worm, which retains its power of fecundation and germination, and transmits the infection to its offspring, throws a flood of light upon the pathology of the transmission of syphilis by heredity. When to this evidence we add the results of the experiments of Maffuci and Baumgarten, who succeeded in infecting eggs with tuberculosis and in detecting that disease in the resulting chicken, it almost seems that the question is settled."

Influence of the Mother.

In order that syphilis may be conveyed by the mother her disease must be constitutional. It is very probable that the ovule of the female is infected in the same way as are the spermatozoa of the male.

When impregnation occurs later than within two weeks of the evolution of general manifestations the fœtus is almost inevitably affected, and the activity of the disease in the child will be in proportion to that of its early stage in the mother, unless the disease has already been modified by active mercurial treatment.

Statistics show that such embryos rarely reach maturity, abortion occurring usually in from the fifth to the seventh month, sometimes as early as the third.

In such cases, in addition to the disease of the ovule itself, the nutrition and growth of the fœtus, which depend upon the richness and purity of the mother's blood, are impaired in proportion to the severity of the disease in the mother.

The frequent observation that the product of conception occurring while either parent is in the early and active stage of the disease is intensely syphilitic or fails to reach maturity, and that healthier children are produced as the disease in the parent becomes less severe, is ground for the assertion that the severity of the syphilis in offspring is in proportion to its activity in either parent at the time of conception. Thus, if a syphilitic woman becomes pregnant, or if the disease is derived from a man in whom it is active, the first fœtus may live only to the third month. Without treatment the next pregnancy may have a similar result, gestation possibly continuing a little longer. As the disease becomes modified by time or treatment a living but syphilitic child

may be born; in succeeding pregnancies the traces of the disease bec less, until finally healthy children may be begotten.

The power of hereditary transmission peculiar to the mother depe as in the case of the father, upon the condition of the syphilis in organism, similar periods of latency, both spontaneous and due to n curials, being met with in the female. If her system at the time conception is temporarily free from syphilitic influence, her ovules capable of producing healthy children.

The number of syphilitic children which a woman may prod varies. In some cases of a mild character healthy children may fol the birth of one or two infected ones. In other cases, particularly those partially or entirely untreated, there may be six or more.

As a rule, after the lapse of six years the influence of the dise becomes so feeble that the risk of transmission is extremely slight.

Infection of the Mother and Child Through the Utero-placen Circulation.

There can be no doubt that owing to the loss of the normal filtrat power of the placenta a fœtus which inherits its disease from a syphil father may, in a greater or less degree, infect its mother, and tha mother infected with syphilis after the conception of a healthy cl may transmit that disease to her offspring.

In support of these well-known facts we can offer only hypothe which, however, are based on strong analogical evidence. It is the r that the placenta acts as a very perfect filter, and wholly prevents passage of solid particles of matter. If we assume that the produ of syphilitic infection are ptomaïns or toxins which are soluble, and tissue-elements which are solid particles, the deduction may be m that in the pregnant woman there is a continuous interchange of ser between her and her offspring. Now, if this serum contains syphil toxins, it is reasonable to conclude that the mother receives a modif syphilitic infection or intoxication; she is, as we may say, vaccinat This condition, while in all probability not rendering her syphili confers immunity to the infection. But it is possible for micro-orga isms so to damage the placenta by causing emboli, hemorrhages, a endothelial necroses that its filtering power is in a measure lost, a that through it solid particles may permeate. If these hypotheses true in essence, the conclusion is warranted that in exceptional cases healthy mother may be infected by her syphilitic fœtus.

Assuming that the toxin theory is scientifically true, we may in that the pregnant woman who is infected with syphilis after concepti nourishes her infant with a serum more or less rich in toxins, and t in proportion to the quantity and malignancy of the circulating pois

the child is affected, and that when it is very intense death is produced.

In all probability, therefore, the toxic principles of syphilis may be conveyed through the uteroplacental circulation from mother to fœtus, and *vice versâ*, and full infection may, in rare cases, occur when the filtrative power of the placenta has been impaired by morbid changes.

The mothers who bear syphilitic children and present no evidence of infection may be thin and pallid or healthy and robust. Some authors think that they are the bearers of a modified syphilis, while others claim that they later on may, and often do, present tertiary manifestations. In all probability those authors who claim that a modified syphilis has been produced are correct. Though von Düring emphatically says that these women are in a latent tertiary condition, and that they do later on present undoubted evidence of tertiary syphilis, and reports three cases, I think that we have not as yet a sufficiency of uncontrovertible facts to allow us to make magisterial statements. We still need more well- and long-observed cases.

It is very certain, however, that these women acquire an immunity to syphilitic infection from others. On this subject Colles says: "I have never witnessed nor heard of an instance in which a child deriving the infection of syphilis from its parents has caused an ulceration on the breast of its mother." Colles's statement of what he observed has passed current as Colles's law. Von Düring very happily formulates it as follows: "A healthy woman who, impregnated by a syphilitic man, has borne a syphilitic child, may be free of all symptoms of syphilitic infection, and may at the same time be refractory against any syphilitic infection."

Abortion resulting from the death of the fœtus usually occurs about the sixth month, while that caused by infection of the mother during pregnancy takes place somewhat later. An aborted fœtus is usually in a macerated condition, the skin being easily detached and the surface having a livid purple color, and various lesions will be found in some of the viscera. The integument may show nothing characteristic or large bullæ may be found on the soles and palms.

In syphilitic children stillborn at term or dying soon after birth frequently no lesion of the skin is found. The greater number of syphilitic children born living appear well nourished and perfectly healthy, but, generally at the end of three weeks, evidences of disease show themselves.

LESIONS OF THE PLACENTA.

The characteristic lesions of the placenta are changes in volu weight, and consistency, and, microscopically, the thick, plump form the fœtal villosities, which is due to the filling-up of the villous spa with an abundant proliferation of moderately sized cells proceeding fr the bloodvessels, complicated with a proliferation of the cell-conte of the villi. Obliteration of the bloodvessels, and, finally, compl destruction of the villi, ensue. This affection may appropriately called "Deforming Proliferation of Granulation-cells of the Placen Villi."

DEVELOPMENT OF HEREDITARY SYPHILIS.

The first indication of disease in a child apparently healthy at bi is the characteristic *snuffling*, which is the cause of great discomfort, a in some cases death ensues from the obstruction to breathing. Emac tion may progress to such an extent as to leave the skin of the bo loose and wrinkled. The integument of the face seems to be dra tight over the bones and assumes an earthy sallowness. The e become prominent, and the juvenile expression is lost, until these childi come to look like little old men and women. In some cases, howev even of children intensely diseased, excessive emaciation is not observ so that there seems to be no special relation between this condition a the activity of the disease. Simultaneous with these changes the chil nutrition suffers, gastro-intestinal and pulmonary lesions may be dev oped, and various skin eruptions make their appearance.

Eruptions of Hereditary Syphilis.

The principal eruptions are—the erythematous syphilide, or roseol the papular syphilide; the vesicular, the pustular, the bullous, and t tubercular syphilides; and a form of furuncle.

With certain modifications the features of syphilitic eruptions infants are similar to those in adults. In both cases they appear crops, but in the hereditary disease the later rashes are less symmetric and are likely to be limited to particular regions, and the fever acco panying an eruption in the acquired disease is frequently absent. A though their general course is subacute, yet on account of the activi of cell-growth and circulation in the integument of infants the eru tions are developed rapidly and tend to involve extensive surfaces. may also be noticed that such lesions as papules and condylomata a less firm and solid than similar ones in adults.

The erythematous, papular, tubercular, and gummatous eruptions are essentially the result of syphilitic processes, while all the ulcerative rashes are the outcome of a symbiosis of syphilis and pyogenic bacteria.

THE ERYTHEMATOUS SYPHILIDE, OR ROSEOLA.—This is the most frequent and earliest hereditary eruption, appearing about the third week, and often preceded or accompanied by coryza. It begins on the lower part of the abdomen as minute round or oval pink spots, which at first disappear on pressure. It rapidly invades the trunk, face, and extremities, and is generally fully developed within a week. The spots then vary from a third to half an inch in diameter, assume a dull-red coppery hue, and no longer disappear on pressure, owing to pigmentation of the skin. In some cases, as in adults, punctæ of a deeper color are seen on the surface of the roseolous patches, denoting the situation of follicles around which the hyperæmia is more intense.

The patches are not usually elevated, and desquamation is generally absent, except in severe cases about the hands, feet, and nates, where it may be limited to the margins of the patches, or it may be so extensive as to resemble psoriasis. Sometimes the spots run together and fissures form, either superficial or of sufficient depth to cause much pain.

The early change of color to a coppery hue, seen in irregular patches upon the chin, in the folds of the neck, and on the nates, where other lesions frequently coexist, is an important diagnostic feature.

The tendency to a circular form, so common in acquired syphilis, is observed in later hereditary eruptions more frequently than in roseola.

The eruption is sometimes so evanescent and its color so faint that it passes unobserved. By attention to the characteristics mentioned and to the history of the patient the diagnosis will generally be sufficiently easy.

THE PAPULAR SYPHILIDE AND CONDYLOMATA LATA.—These lesions will be described together on account of their pathological similarity.

The papular syphilide may be the first eruption, and not infrequently it is intermingled with a roseola, or three or four different syphilides may be seen at the same time on one child. The small acuminated papule of acquired syphilis is scarcely ever seen, except in a relapse or late in the course of the disease. Flat papules, small and large, scattered symmetrically over the body are the common forms. Crescentic grouping is seldom seen except at a late period, and then only about the joints and on the extremities. The papules, at first dull red, and then coppery, may have a smooth surface, or the epidermis may exfoliate, especially on the soles and palms.

In this connection may be mentioned certain diffuse infiltrations sometimes observed which have not yet been carefully described. When

papules are copiously distributed upon the palms and soles it may l noted that they increase rapidly in size and number and fuse togethe The skin is of a dull-red color, much thickened and scaly. An enti foot or hand, or the gluteal region from the thighs to the top of tl sacrum, may be thus involved.

Irritation from active movements or from pressure often excit fissures and ulceration, which are the cause of much suffering. Th condition may accompany any lesion of hereditary syphilis; its cour is chronic, and it is not, as a rule, affected by internal medication. Tl duration of the hereditary papular syphilide depends upon treatmen to which it promptly yields.

Condylomata lata are simply modifications of the papular syphilide due to their situation between the folds of skin or at its junction wit mucous membranes or wherever there is moisture. The change in th papule is chiefly hypertrophic, there being no decided histological di ference between the two forms of eruption. In size condylomata vary their shape is governed by the conformation of the parts upon whic they grow; and in color they are usually grayish-pink to dark brow Their surface is generally flat, sometimes fissured and ulcerated, when scanty offensive secretion exudes, which may form a thin, dirty-colore crust. Particularly in cachectic infants a false membrane may form which is slightly adherent and leaves a raw, bleeding surface o removal.

Condylomata are among the early and most obstinate of hereditar lesions, local measures appearing to have more effect upon them tha internal medication. They vary greatly in number, and in infants ar most frequently seen about the anus. A characteristic symptom is ex hibited when they exist at each angle of the mouth, associated wit mucous patches in the buccal cavity. They are much aggravated b neglect and want of cleanliness, but with proper care and treatmen they shrink and disappear, leaving a temporary copper-colored stain.

The Vesicular Syphilide.—This rare form of eruption occur among the early symptoms in severe cases of hereditary syphilis. It i never general, and is usually associated with a pustular or bullous erup- tion, and appears in groups of vesicles, closely and irregularly packe together, upon the chin and about the mouth, upon the forearms, th nates, the hypogastrium, or the thighs. It rarely shows a tendency t relapse.

The Pustular Syphilide.—This eruption usually appears befor the eighth week in children profoundly syphilitic, but is not infre- quently seen in those whose nutrition is fair. The later it appears th more likely are the pustules to be small, few, and superficial. It ma invade the entire body, but is usually more abundant on the thighs, but-

tocks, and face, while elsewhere the pustules are thinly scattered and irregular.

The pustules vary from a third of a line to a line in diameter at their bases, and from a third to half of a line in elevation. The deep-red color of their thickened bases ends abruptly at their margins. They may remain intact for many days, and after rupture the ulcerated surface may or may not become incrusted. Especially about the mouth there is a tendency to grouping and the formation of quite extensive patches, or the whole head and face may be thus involved. The crusts are generally darker than those of eczema and contagious impetigo, and the ulceration beneath is deeper. Itching and burning are usually slight, but much uneasiness and even suffering may be caused in certain locations, as when pustules form on the scrotum, the buttocks, or the face. Groups of pustules, attended by much redness and thickening of the surrounding skin, may form on the palms and soles, and the nails may be destroyed by pustules developed around them or beneath their free extremities.

This eruption usually leaves no permanent trace, but in some cases marked loss of tissue and scarring result, which become less noticeable as the child grows older. Sometimes alopecia results from cicatrices on the scalp; the free border of the lips or the angles of the mouth may be partially destroyed.

FURUNCULAR ERUPTIONS.—As early as the sixth month or as late as the third year crops of furuncles may appear, constituting the sole symptom of hereditary syphilis or associated with other lesions. If symmetrically arranged, as they usually are, they are quite numerous; if irregularly distributed, they are few. They differ in some respects from ordinary furuncles.

Their bases are usually compact, well defined, and of a dull coppery-red color. Their formation is slow and without signs of active inflammation. They begin as a small nodule in the corium, and gradually increase to the size of half a nutmeg. A superficial ulcer forms at the summit of the nodule, and a mass of slough comes away, leaving a deep cavity with irregular, unhealthy walls and everted discolored margins, which may remain in a sluggish condition for many weeks or may increase in dimensions. The discharge is scanty and offensive.

THE BULLOUS SYPHILIDE—PEMPHIGUS.—This eruption, sometimes seen at birth and sometimes a month or six weeks after birth, is always indicative of a severe form of hereditary syphilis, and is frequently a precursor of death. As regards its situation, it resembles the pustular syphilide, but the palms of the hands and the soles of the feet are most frequently attacked, the lower extremities being most extensively involved, while upon the trunk the bullæ are sparsely scattered—

Diffuse infiltration, ulceration, and the formation of fissures m attend the development of this eruption upon the thighs and butto and upon the extremities. It may accompany pustules and, less f quently, one or more of the other syphilides, is generally copious, a is always symmetrical. The bullæ are developed rapidly, and their se purulent contents soon become purulent. They are surrounded by rim of thickened integument of a coppery color, and, unlike other for of pemphigus in children, lack uniformity of shape, some being conic others rounded, and still others flattened.

THE TUBERCULAR SYPHILIDE.—This lesion, much rarer in here tary than in acquired syphilis, may occur as early as the sixth mont or a second attack may be met with several years after birth. T tubercles begin as deeply seated papules or as small movable nodules, the latter case greater depth of tissue being involved. The skin so becomes implicated, and a sharply defined tumor, from a quarter of a inch to an inch or more in diameter, results, which may disappe leaving no trace, or it may break down into an ulcer which is very pe sistent and demands local as well as constitutional treatment.

Regions where the connective tissue is loose and abundant are tl favorite seat of tubercles of the largest size. Their surface sometim becomes scaly, and the eruption then resembles psoriasis.

GUMMATA AND GUMMATOUS ULCERS.—These lesions sometim appear as early as the third year, but generally later, even as late as th twentieth year. After this period it is not usual for ulcerations to hav the features of hereditary syphilis, typical gummata having been ob served by me in only one instance.

The course of these lesions in hereditary syphilis is similar to that i acquired, and therefore needs no additional description.

A case of symmetrical gangrene of the extremities and ears ha been reported occurring in a syphilitic infant, which was cured by th local use of mercurial ointment and the administration of iodide of pota sium.

Affections of the Mucous Membranes.

One of the earliest and most constant symptoms of hereditar syphilis is coryza, which is due to structural changes in the mucou membrane of the nasal passages. A few days before the appearance o general manifestations there may appear a serous discharge from th nostrils, sometimes trifling, sometimes so excessive as to impede respi ration, especially during sleep and in the act of nursing. This discharg is accompanied by the characteristic "snuffling."

The nasal secretion soon becomes purulent, bloody, and very offen sive, and causes swelling and excoriation of the alæ nasi and upper lip

Tenacious crusts composed of the dried secretions form on the inflamed surfaces, causing much discomfort. In its mildest and rarest form this affection is a simple erythema. Generally, ulceration of the mucous membrane ensues, and not infrequently the disease progresses to the bony structures, producing necrosis, with perforation or even entire destruction of the septum, followed by striking deformity.

The intensity and chronicity of specific coryza, the limitation of the disease to the nasal passages, and the coexistence of other syphilitic manifestations are sufficient to establish the differential diagnosis.

MUCOUS PATCHES OF THE MOUTH.—In the infant these lesions often lose their characteristic appearance quite early. At first they consist of slightly elevated portions of mucous membrane with whitish surfaces and surrounded by erythematous areolæ. The pearly epithelial covering may be soon cast off, leaving a smooth red surface, slightly depressed, which may ulcerate. The regular outline of the round or oval patches may be lost and a number coalesce, thus involving a considerable extent of surface, which may be superficially ulcerated, and in cachectic subjects is often partially covered by an extremely adherent false membrane of a pale-brown color. The patches frequently become hypertrophied and resemble condylomata lata.

In the early course of hereditary syphilis very many distinct mucous patches may be counted; at a later period they are less numerous, but they show a decided tendency to relapse, having been seen by me as late as the sixth year.

The most common situations of this lesion are the angles of the mouth, the mucous membrane lining the cheeks, the pillars of the fauces and the tonsils, the sides and frequently the dorsum of the tongue, and also very often the portions of the gums adjacent to the teeth. On account of the difficulty of pharyngeal examination in young infants we cannot state positively the frequency of the invasion of this region. There is certainly less tendency to extensive ulceration of the pharynx and tonsils in infants than in adults. At the angles of the mouth the ulceration is often extensive and painful.

The serous secretion of mucous patches is rather free, and quite as infectious as that of the initial lesion. Hence the necessity of their early recognition, and of measures to prevent contagion. Nursing at the breast of any one but the mother, kissing and fondling, must be prohibited, and great care and cleanliness must be observed in the use of bottles, cups, etc. The infection of the nurse by a child having mucous patches of the mouth is particularly liable to occur in hospitals and in lying-in asylums.

Only when ulceration exists, or when the mucous patches are complicated with diphtheritic membrane, is their diagnosis from stomatitis

simple or parasitic, attended with difficulty. In the absence of distinctiv evidence in the history and on the body of the child our decision mus be based on the local appearances. In simple stomatitis the inflamma tion is generally more diffuse, the whole tongue in particular bein much congested and often covered with vesicles, which are not see in the specific disease. The tendency of mucous patches to develo at the angles of the mouth is a valuable point in diagnosis. In para sitic stomatitis the inflammation is less localized than in the specific form the general hyperæmia is greater, and the false membrane has a white color and a more patchy appearance. In both forms of non-specific stomatitis the sulci between the gums and cheeks and the gums themselves are often involved; rarely in the specific.

The history of the case, therefore, and the circumscribed character and limited distribution of mucous patches, will enable us to make a diagnosis.

Gummatous Infiltrations.—These lesions, consisting of cellular infiltration of the mucous membrane, are usually developed upon the hard palate or upon the posterior pharyngeal wall, when they may be mistaken for retropharyngeal abscess. They are rarely seen before the third year of life, and generally occur from the sixth to the twelfth. The first indication of their formation is a reddish elevation of the mucous membrane, forming a round or oval patch from half an inch to an inch and a half in diameter, which increases in size and in prominence until a well-defined tumor results. Necrotic changes almost invariably occur in the tumor, leaving an ulcer with sharply cut, undermined edges and tenacious greenish secretion, involving the mucous membrane even to the subjacent bone.

Their course is chronic, with slight tendency to invade surrounding parts. Upon the hard palate they give little trouble, but upon the wall of the pharynx they are the source of much suffering and inconvenience in swallowing. The health may be further impaired by the copious secretions and the noxious gases developed. Repair of the ulceration is followed by cicatricial contractions, which on the hard palate may affect phonation, and on the wall of the pharynx may interfere with deglutition. The diagnosis is generally easy.

In tuberculous ulceration of the hard palate the process is more active and less sharply limited, while other evidences of phthisis exist. Retropharyngeal abscess is much more acute in its invasion and progress than a gummy tumor, and in the latter case signs of pre-existing syphilitic lesions may be found. In all cases the previous history of the patient must be learned.

Affections of the Larynx.

In the early periods of hereditary syphilis the larynx and upper air-passages may be the seat of simple hyperæmia, of mucous patches, or of ulceration involving the mucous membrane, or even the cartilages, to such an extent as to result in stenosis.

Like gummatous affections of the pharynx, those of the larynx belong to the late manifestations of the disease. Like them, also, their course is quite rapid, and unless promptly checked they produce great deformity. Their symptoms are a varying degree of hoarseness and even total loss of voice, with difficulty of respiration in the more severe cases. Iodide of potassium in full doses should be given.

Affections of the Lungs.

Interstitial cell-proliferation, complicated in some instances with gummatous infiltration, are the lesions usually found in hereditary syphilitic infants.

When the lesions are extensive and fully developed the lung is reduced in size, increased in consistency, and when cut is found to be firmer and less vascular than normal. Scattered upon the surface of the lung and through its substance, on the smaller vessels and bronchi, which are much thickened and look like yellow cords, are numerous nodules of various sizes. The more recent are small and of a grayish-pink color; the older ones may be the size of a filbert, are light yellow, and when excised exude a thin milky fluid, while serum escapes from the lung-substance. The former appear to be homogeneous, while the latter are granular and may contain pus. The pulmonary pleura, especially in the vicinity of the nodules, is thickened and opaque.

The entire lung is usually more or less involved in the morbid processes, though in some cases the nodules may be few and confined to a portion of a single lobe.

The first step in the process is evidently active congestion, followed by cell-proliferation around the bronchioles, and in a less degree in the walls of the capillaries, resulting in partial or complete obstruction of their lumen and consequent destruction of the function of the lung-tissue.

The nodules, which represent one or more plugged and distended alveoli, consist of a mass of connective-tissue cells, fibrous tissue, granular débris, and perhaps some gummatous tissue. Like all new growths, they are liable to degeneration, fatty or caseous, and may contain pus in their centres. The pleural changes are due to hyperæmia and increase of fibrous tissue. True gummatous nodules have been found by

some observers. While two forms of nodules, the gummatous and th connective tissue, may exist, their gross and microscopical appearance are in some cases so very similar that it is impossible to distinguish them. The gray hepatization of pneumonia resembles syphilitic induration, but may be recognized by the greater succulence and less resistance of the lining tissue and by the escape of true pus on pressure. Owing to the nature and extent of these pulmonary lesions life is, in most cases, destroyed. They may, however, exist in a moderate and localized form without such a result.

While these changes usually take place in intra-uterine life, we may find them at any time when the syphilitic diathesis is active, but most frequently within the first eighteen months of life. They are not attended by much systemic reaction, and may be developed in any portion of the lungs either symmetrically or unilaterally.

Recent investigations have clearly shown that in some children affected with hereditary syphilis the lungs very frequently are the seat of morbid change which to the eye seems of syphilitic nature, but which under the microscope is found to be tuberculous.

Affections of the Liver.

The functional activity of the liver in infancy renders it subject to profound structural changes, which consist chiefly of connective-tissue infiltration.

The primary changes are vascular. The walls of the vessels are much thickened, and around the tunica adventitia numerous nuclei and cells, with an abundance of fine fibrillar connective tissue, are found. The calibre of some of the vessels is diminished, and that of others is entirely obliterated. Moreover, various stages of fatty degeneration of the hepatic cells are found. Increase of connective tissue is observed in the parenchymatous network of the organ and in the capsule, which may be thickened either in its entire extent or especially on its upper surface. Adhesions may form between the convex surface and the diaphragm or the peritoneum of the anterior abdominal wall.

Gummous hepatitis in hereditary syphilis is admitted by several authors. There are two forms, one consisting of numerous minute tumors scattered through the liver, called by Wagner miliary syphiloma and the other consisting of one or more large circumscribed tumors such as are found in the adult. Either of these lesions may be accompanied by fibroplastic infiltration.

In most cases of liver syphilis in infants hereditarily infected the diagnosis may be made from the following symptoms: a deep wine-colored venous stasis and œdema of the lower extremities, often accompanied by pemphigus; ascites, due to mechanical obstruction of the

circulation, as in cirrhosis; a more or less pronounced chloro-anæmic appearance of the face; and the presence in the urine of albumin and hæmatoglobulin. Vomiting may occur, and constipation, alternating with diarrhœa, has been observed. Icterus, symptomatic of this affection, has not been noticed. A fatal result commonly ensues in the early weeks of the child's existence.

A case of fatal icterus is reported in a newborn child whose mother was syphilitic. At the autopsy the liver was found to be hypertrophied and the seat of gummata. Portions of tissue taken from the liver and spleen, and some blood when cultivated, showed clearly the presence of the proteus vulgaris. This organism had infiltrated the intracellular spaces of the liver.

Affections of the Spleen.

In cachectic children and in those in whom the disease assumes a severe form more or less hypertrophy of the spleen is sometimes observed, usually during the early stages of syphilis. The enlargement is rapid, the size of the organ often being quadrupled in two or three weeks. Mercurial treatment induces the rapid subsidence of the condition.

Although we are ignorant of the pathology, the acuteness of its invasion and its rapid involution suggest hyperæmia rather than permanent cell-growth. Still, it is quite possible that cellular hyperplasia may take place in the spleen as it does in the liver. The peritoneum may be secondarily attacked when the liver and spleen are affected.

Lesions of the Pancreas.

In some rare cases the pancreas has been found to be affected in hereditary syphilis. In the most marked cases the organ was much enlarged, its weight was doubled, its tissue firm, and on section it presented a glistening white appearance, somewhat like that of scirrhus, the granular substance being very indistinct. Under the microscope the interstitial connective tissue, especially between the larger lobules, was found greatly increased. Portions of lobules were compressed, and their epithelium was atrophied and in a state of fatty degeneration. The vessels of the interstitial tissues were few and their walls were thickened. This extreme degree of the process was observed in seven cases; in six the changes were less perceptible, and the lobules could be distinctly seen, although the organ was enlarged and rather denser than normal. The head of the organ was more altered than the tail.

It is probable that this degeneration of the pancreas is one of the causes of gastro-intestinal disturbances in hereditary syphilis.

Affections of the Kidney.

Our knowledge of the condition of the kidney in hereditary syphili is very limited. Lancereaux states that he has found connective-tissu proliferation with fatty degeneration of the epithelium lining the tubul uriniferi. The organs were firm and of a yellow color. Bradle reports the case of a syphilitic child four months old, with dropsy an albuminuria, who was cured by mercurial treatment.

The studies on the pathological anatomy of the kidney by Parro show that these organs were studded with numerous tumors varying in size from a pin's head to a cherry-stone. The smallest were white, and the larger were yellow at their periphery and reddish in their centre. In some spots there was partial destruction of the renal tissue, and there were also infarctions. The lesion consists of a circumscribed or diffuse infiltration of round embryonic cells, with others of fusiform shape, into the connective-tissue framework, followed by compression or destruction of the tubules and colloid degeneration of their epithelium. In the early stages of this affection the organs become much enlarged, and Mollière reports a case in which they were twice the normal size. Gradual atrophy follows degeneration of the new cells, and the organs may finally become much reduced in size.

Several cases of paroxysmal hæmoglobinuria occurring in syphilitic children have been reported in which active syphilitic treatment produced beneficial results.

Affections of the Suprarenal Capsules.

Lancereaux has noted enlargement of these organs in a large number of cases. Virchow has also observed it, and speaks of a case in which complete fatty degeneration was found—a condition met with also by Hulke. According to Lancereaux, proliferation of young connective-tissue cells in the cortical substance has been found by Bärensprung. In a case in which the left suprarenal capsule was enlarged and adherent to the diaphragm Hennig found its contents gelatinous.

Affections of the Intestines.

The intestines are frequently the seat of microbic invasion early in hereditary syphilis, and from this cause gastric and bowel troubles are developed. The intestines may be the seat of structural change.

Förster has described a fibroid degeneration of Peyer's patches in a syphilitic infant who died six days after birth with lobular pneumonia and purulent bronchitis. The glandular structure of the patches had been replaced by elevated grayish-red masses, with smooth surface and yellowish centre, composed of nuclei, cells, and fibres of connective

tissue. Similar observations have been made by Eberth, Roth, and Oser, who have described an affection consisting of multiple circumscribed indurations, varying in size and generally circular, situated on a level with Peyer's patches and the solitary glands, the surrounding mucous membrane being smooth and slate-colored or more or less ulcerated.

Affections of the Testicles and their Appendages.

The most common affection is orchitis, and, while inflammation of the epididymis is sometimes observed, it is but almost always as a complication of orchitis. Involvement of the vas deferens is uncommon with epididymo-orchitis.

The orchitis begins slowly and insidiously. No pain is felt by the child, and attention is not called to the diseased organ until its dimensions have become so marked as to attract the notice of the mother or nurse. As usually seen in practice, the testis is of the size of a pigeon's egg. There is no tendency to the development of large tumors. To the touch the swelled testis is firm (less hard and ligneous than in the adult), indolent, painless, and decidedly heavy. It can usually be handled without causing pain. In some cases there is concomitant hyperæmia of the scrotum. In rare instances the surface of the tunica albuginea is uneven, and a sensation as if small shot or split peas were seated in its superficies is conveyed to the touch.

The epididymis may be enlarged in part or in whole. The swelling is smooth and firm, and pressure upon it sometimes causes pain. The enlargement of the vas is similar in all respects to that of the epididymis.

These affections, uninfluenced by treatment, usually run an uneventful course, and may end in resolution or in atrophy, particularly of the gland-substance. Fungous testis, abscess, and necrosis are rare complications.

Hydrocele is a more frequent complication than has heretofore been conceded. It may be slight or well marked. Its existence in the infant should always excite suspicion, since its origin in syphilis or tuberculosis is usually constant.

Diagnosis.—As a rule, intelligent study of a case of testicular lesion in a young child will lead to a correct diagnosis. It is necessary to obtain the history of both father and mother, and then that of the child. In the early months of hereditary syphilis it may be possible to gain a knowledge or observe a vestige or sequela of some characteristic lesion itself. In this event the diagnosis will be easy. When, however, we can obtain no information concerning the father or mother, and the child is free from syphilitic lesions or their traces, difficulty is experienced. Then we should consider the character of the tumor,

and see whether it conforms to the description given. Stress has been laid on the fact that in syphilis both testes are usually involved, while in tuberculosis commonly but one is affected. This, however, cannot be accepted as a general rule, since we not uncommonly find that the syphilitic affection is unilateral. Then, again, too much stress cannot be laid upon the condition of the epididymis and vas. In syphilis these appendages may be involved in whole or in part; in tuberculosis it is common to find them much enlarged and sometimes nodulated. When, therefore, we see a case in which there is a unilateral swelling, marked enlargement of the epididymis, and perhaps of the vas, we may suspect syphilis. In all such cases it is absolutely necessary to examine the prostate and seminal vesicles by rectal touch, and if they also are found to be swollen the presumption will be warranted that the case is one of tuberculosis. On the other hand, freedom of these structures from disease points in a measure to the existence of syphilis.

No absolute conclusions can be drawn from the conditions attending the invasion of the disease. In syphilis the enlargement as a rule takes place slowly, but sometimes rapidly. In tuberculosis the invasion may be slow and insidious also. But it is well to remember that the most common mode of invasion is acute and rapid, and attended with marked inflammatory symptoms. This condition is rarely, if ever, seen in syphilis.

While, therefore, in most cases a clear diagnosis may be made, instances will occur in which it is impossible to say whether the lesion is syphilitic or tuberculous. Cases will be met with in which the syphilitic history is clear and the testicular symptoms point to that origin, yet antisyphilitic treatment fails to produce resolution. In these cases we observe what is so common in adults—namely, a tubercular infection in a syphilitic subject. This is common in many organs and tissues, notably the lungs, bones, joints, meninges, and testes. It is always well, therefore, to remember this frequently occurring mixed infection. A thickened, indurated, and enlarged vas is strongly indicative of tuberculosis. The same may be said of cases in which there are multiple ulcerations and adhesions of the scrotum to the testicles.

It is well to remember that the testes of young children are sometimes the seat of carcinoma, encephaloid cancer, and sarcoma. These malignant growths are usually seen in the first year of life. They are, as a rule, of rapid development, of large size, and may be accompanied by inguinal adenopathy and usually more or less pain, and always terminate fatally.

The pathological change in most cases of syphilis of the testicle in infants is round-cell infiltration. In rare instances gummatous infiltration may be present.

Treatment.—In my experience the mixed treatment in full and increasing doses is the most efficient remedy in these testicular lesions, as it is in the bone- and joint-lesions of hereditary syphilis. I have been often much surprised at the large doses which infants can take with impunity and marked benefit. This treatment, with intermissions, should be kept up for at least two or three years.

Locally much good can be derived from mercurial inunctions to the scrotum, using, with great care as to the avoidance of dermatitis, white precipitate or blue ointment.

When the organ is much destroyed by degenerative processes ablation may be necessary.

Affections of the Synovial Sheaths.

In two cases of hereditary syphilis under my observation the extensor tendons of the hands were involved, as indicated by marked fusiform swelling over the metacarpal bones, of doughy consistence, and freely movable under the skin, which was slightly distended and reddened. Its development was rapid and associated with other lesions, particularly osseous, its subsequent course indolent and not appreciably affected by mercurial treatment. In one case cure resulted from the application of a compress over a piece of mercurial plaster after withdrawal of the fluid with the hypodermic needle. Other tendinous sheaths than those of the hands may be affected.

Affections of the Nails—Onychia.

The nails are not so frequently involved in hereditary as in acquired syphilis. There are two varieties of onychia: the ulcerative, which is the more frequent, and the non-ulcerative.

Ulcerative onychia begins at the side or base of the nail as a papule or pustule, which soon ulcerates, the process extending along the concave base of the nail, or along the lateral margins, and finally involving the matrix of the nail, which is soon cast off. The distal phalanx becomes very painful and enlarged, the finger resembling in shape an Indian club. The thickened everted edges of the ulcer, its sloughy base, and sanious discharge, and the coppery hue of the surrounding skin are characteristic.

This form of onychia may be met with alone or associated with general papular or ulcerative eruptions, and is most frequently seen during the first year or two of the child's life. In cases improperly treated it may be developed later, and, though its course is generally protracted, it may be shortened by appropriate treatment. The nails of the hands seem to be more often affected than those of the feet.

The growth of a deformed and useless nail or. cicatrization without

a new nail may be expected in severe and protracted cases not subjected to treatment. In such cases osteitis of the phalanx may indicate amputation. The second form of onychia is even more chronic than the preceding, and is a much later manifestation of the disease. It begins as a swelling of a coppery hue at the base or around the margins of the nail, which shades off into the surrounding parts. At the same time the nail loses its smoothness and gloss, and becomes thickened, fissured, and brittle. The nail has a dirty-white color, and there is always hyperæmia of the matrix and the surrounding parts, with much deformity of the phalanx, which may not be permanent. The nail may be finally restored in a perfectly healthy state, and the bone is usually not involved.

Affections of the Hair.

The features of alopecia in hereditary syphilis are similar to those of the shedding form in the acquired disease. It occurs also in connection with dermal lesions of the scalp, particularly pustular. In other cases a dry condition of the hair seems to be a result of the adynamic influence of syphilis, rather than any specific process.

Affection of the Thymus Gland.

Abscess of the thymus gland is of very rare occurrence in hereditary syphilis. We know nothing of the clinical history of this affection, and very little about its pathology.

Lesions of the Umbilical Vein.

Oedmasson and Winckel found stenosis of the umbilical vein in the cords of certain macerated fœtuses whose death was attributed to syphilis. The former was of the opinion that it was caused by the atheromatous process. Birch-Hirschfeld, who has also observed this condition, believes that it is due to changes similar to those occurring in the arteries of the brain, as described by Heubner. Should future investigation confirm the view of Hirschfeld, this lesion of the umbilical vein must be considered an important element in causing the death of the syphilitic embryo.

Microbic invasion of the umbilical cord may occur, and as a result septicæmia may be produced.

Hemorrhagic Syphilis.

Hemorrhagic syphilis in infected infants is sometimes seen in the form of large and small petechiæ and ecchymoses. It may occur into the skin and mucous membranes, and also into the viscera and from the umbilical vein.

Micro-organisms in Hereditarily Syphilitic Children.

Observations made by Kassowitz and Hochsinger show that the tissues of syphilitic infants contain many micro-organisms. In several cases of infants who died a few days after birth the last-named observer found streptococci and staphylococci in the skin above the Malpighian layer, in the vessels, and lymphatics. He thinks that these microbes penetrate the skin and mucous membranes through lesions of continuity produced by the infection. Kassowitz and Hochsinger found a chain-coccus in the blood, bones, and viscera of syphilitic infants, but not in non-syphilitics. Chotzen concludes that in some cases the microbes enter the system through the nasal mucous membrane, which is in an inflamed condition. They are then carried by the circulation to all parts of the body. In this manner septicæmia may be produced.

Affections of the Lymphatic Ganglia.

General subacute adenitis, invariably present in the early stages of the acquired, is always absent in hereditary syphilis, and is an important feature in the differential diagnosis. Swelling of the cervical ganglia, which often accompanies active lesions in the mouth and throat and upon the scalp, frequently results in abscess, particularly in cachectic children, when the condition can be distinguished from tuberculosis only by the history of the case and by concomitant symptoms.

Affections of the Bones.

The bones are affected in various ways by hereditary syphilis. In the early months of infancy the morbid change is frequent in long bones at the junction of the epiphysis with the diaphysis. In the first years of hereditary syphilis the small bones of the fingers and toes are also frequently affected, while later on a tendency to invasion of the shafts of long bones and of the surfaces of flat ones is noticed. We shall therefore describe the diaphyso-epiphyseal lesion under the name *osteochondritis syphilitica*, and the affection of the long bones under *periostitis*. The lesions of the bones of the fingers and toes are somewhat peculiar and require a separate description.

Osteochondritis.—This affection is claimed to be one of the most constant manifestations of hereditary syphilis. It is often the only one, and frequently its presence decides the syphilitic nature of coexisting lesions. A knowledge of the fact that this affection is exclusively caused by syphilis has been of great service in the study of hereditary syphilis.

The growth of a bone in length takes place at the extremity of the shaft, where the epiphysis is joined to it by a layer of cartilage, and

here syphilitic changes are most often found, which interfere with the normal development of the bone.

The bones most commonly attacked are those of the forearm, the leg, the arm, and the thigh. The clavicle, sternum, and ribs are also attacked, as well as the metacarpal and metatarsal bones. The number of bones involved varies. In stillborn infants and in those dying soon after birth the majority or even all of the long bones may be affected. It is exceptional for the victims of multiple bone lesions to survive, and it is fair to assume that the number of bones attacked varies with the intensity of the syphilitic diathesis.

In these cases of osteochondritis we find at the diaphyso-epiphyseal junction a swelling, which may be visible, but in fat children is often imperceptible. On palpation the bone is found to be encircled by an abruptly limited collar or ring. In some cases the entire epiphysis may be expanded, with or without a distinct ring, at its junction with the shaft. The surface of these swellings and rings is generally smooth; it may be slightly irregular, but is seldom very much ridged. When two contiguous bones are affected they often seem to be fused. In living children the distal more often than the proximal extremities have been found affected, and the affection is generally symmetrical, especially in very young subjects. In some cases, particularly at the lower end of the humerus and at the upper end of the tibia, the lesion does not surround the bone, but is limited to the segment of the diaphyso-epiphyseal junction.

The swellings on the clavicle are usually found at its sternal end, and are sometimes of large size. Those of the sternum are not common in very young children; lesions of the ribs, which occur at their junction with the costal cartilages, are also infrequent, and are generally not so numerous nor symmetrical as those of rickets.

These swellings may be developed slowly or rapidly. They usually remain in an indolent condition, causing little if any pain, and interfering but slightly with the motion of the joint. Under appropriate treatment they promptly subside. The integument undergoes little if any change, and becomes tense and thin only when the tumors are exceptionally large. The joints may be secondarily involved and become the seat of subacute synovitis, the effusion being slight or extreme. Those most commonly attacked are the elbow and knee; as a rule, the joints with short epiphyses are most liable to hyperæmia and effusion. Pressure, accompanied by internal treatment, speedily disperses the joint-swellings, which usually give rise to but slight inconvenience.

Degenerative changes sometimes take place in these osseous lesions. In their mildest form they consist simply of a superficial breaking-down at one part of the swelling. We first observe fluctuation, soon followed

by ulceration of the skin, resembling in appearance that which occurs in gummy tumors. These necrotic changes, however, may be much more active and extensive in the bone than in the cutaneous ulcer, which shows little tendency to increase in size. The epiphysis may be entirely separated from the shaft, and if the superficial ulcer is large it may be extruded. In most cases where the destructive process is extensive the syphilitic diathesis is intense, and a fatal termination ensues. In others, however, reparative changes of an interesting and peculiar character occur.

The intervening cartilage having been destroyed, the diaphysis is united to the shaft by fibres of periosteum only. This membrane becomes much thickened and forms a more or less complete cylinder, uniting the two fragments with considerable firmness. Bony spiculæ shoot from its inner surface between the two osseous surfaces, and eventually bony union is formed. The periosteum continues thickened for a long time, but gradually resumes its normal proportions as the union between the bones grows firmer.

PERIOSTITIS.—While osteochondritis occurs in early infancy, periostitis is a later affection, attacking the bones of syphilitic children who have begun to walk. Whether the active use of the bones has any influence in developing periosteal inflammation we cannot say positively, although its occurrence in the bones of the leg renders this view probable. In the majority of cases the femur and tibia are first attacked, sometimes as early as the second year, but generally in the fourth or fifth. When long bones are involved thus early the greater part of the shaft usually suffers. The bone becomes very tender, and soon is seen to be enlarged to twice or thrice its normal thickness. It seems bent anteriorly, producing marked deformity. The fibula is also sometimes affected, and generally both legs are attacked. The bones of the forearm are, next to the tibia, most prone to this lesion. The earlier it appears the more likely is it to involve both limbs symmetrically; at later periods it may be unilateral and more localized, perhaps forming circumscribed nodes. The skull-bones are sometimes the seat of these nodes, which are apt to be quite large and multiple. In very severe cases they sometimes break down and form troublesome abscesses. Although periostitis usually occurs before the twelfth year, I have seen it as late as the nineteenth year.

DACTYLITIS SYPHILITICA.—In the early months of hereditary syphilis children are often attacked by swelling of the phalanges and of the metacarpal and metatarsal bones. These lesions are of the same character as those of acquired syphilis. The condition is well shown in Fig. 162.

If uninfluenced by treatment, the swellings run a very chronic course, but when treated early they gradually subside.

Swelling of the metacarpal and metatarsal bones usually occurs quite early in hereditary syphilis, and may coexist with dactylitic enlargements.

Like all bone lesions of syphilis, these of the bones of the hands and feet may be complicated with tuberculosis, and in that event antisyphilitic medication will have little if any effect.

Fig. 162.

Dactylitis syphilitica in the infant.

The **treatment** of all bone swellings should combine mercury with iodide of potassium. Mercurial ointment applied locally is very beneficial.

Deformities of the Teeth.

The teeth sometimes are much changed in hereditary syphilis.

Hutchinson, who first described this affection, says: "As diagnostic of hereditary syphilis various peculiarities are often presented by the other teeth, especially the canines, but *the upper central incisors are the test-teeth.* When first cut these teeth are usually short, narrow from side to side at their edges, and very thin. After a while a crescentic portion from their edges breaks away, leaving a broad, shallow, vertical notch which is permanent for some years, but between twenty and thirty usually becomes obliterated by the premature wearing down of the tooth. The two teeth often converge, and sometimes they stand widely apart. (See Fig. 163.) In certain instances in which the notching is either wholly absent or but slightly marked there is still a peculiar color ('a dirty brownish hue resembling that of bad size') and a narrow squareness of form, which are easily recognized by the practised eye." The first set of teeth do not exhibit this malformation.

Hutchinson's Triad.—Hutchinson further insists upon the fol-

lowing triad of morbid symptoms as being absolutely diagnostic of quite well advanced hereditary syphilis: ocular inflammations, chiefly interstitial keratitis; disturbances of hearing; and the above described dental malformations. The association of these three forms of morbid

FIG. 163.

Hutchinson's teeth.

change is found only in cases of hereditary syphilis. To this triad also may be added the condition of general want of development, in which the individual is of child-like stature.

Affections of the Nervous System.

The affections of the nervous system of hereditary syphilis resemble in their evolution and course those of the acquired disease in the complex and disorderly association of symptoms and in the frequent coexistence of eye affections, such as optic neuritis and paralyses of one or more cranial nerves. In the hereditary form the ocular lesions are, in general, more complex and numerous than in the acquired form.

TREATMENT OF HEREDITARY SYPHILIS.

Though the treatment of hereditary syphilis is very similar in many particulars to that of the acquired disease, it presents many divergencies and difficulties, and is not followed by such uniformly good results as are obtained in adults.

As a rule, the treatment of acquired syphilis is orderly, while that of the hereditary form is very often begun in doubt and uncertainty, and throughout its course is subject to all manner of changes and modifica-

tions. Consequently, no specific data can be laid down for a general methodical treatment of hereditary syphilis. It is incumbent, therefore, upon the physician to watch his case continuously, and always to be ready with such measures of relief as may be indicated by the existing lesions.

It must be clearly understood by the physician, and as clearly presented to the parents or guardian, that, as a rule, at least one year and more—generally two—are necessary for the treatment of a syphilitic infant. The disappearance of one crop of manifestations merely means that one stage of the disease has been auspiciously passed over. We must then keep on in order to attenuate the severity of later outbursts. It is always well, however, to temper the activity of treatment by proper intermissions.

The most precocious evidence of hereditary syphilis is the bullous eruption, and it is always the expression of profound systemic poisoning. This eruption brings up the question of the very earliest treatment of hereditary syphilis. For very young infants, as a rule, some mercurial salt in powder form, internally administered, is the one best borne and most commonly productive of good, if such is attainable. For this purpose many prefer calomel, and they administer it in doses of $\frac{1}{8}$ to $\frac{1}{3}$ grain three times daily for very young children. It is well to give a small dose to a very weakly child, and then to increase it as fast as possible. For well-nourished infants $\frac{1}{3}$ or $\frac{1}{2}$ grain may be given three times daily. Calomel can be rubbed up with a little sugar of milk, and the powder placed on the child's tongue before it is put to the breast. In case of diarrhœa, colic, or sleeplessness, a little Dover's powder may be added to the mercurial preparation which is to be used. When it is possible to administer them, adjuvant tonics should be combined with the mercurial. For this purpose the saccharated carbonate of iron is very beneficial. It is palatable and well borne by the stomach, and may often be employed with marked benefit, particularly in children who have reached their third or fourth month.

Calomel may be given for a considerable time with benefit and without deranging the stomach and bowels. However, its action should be carefully watched, and if anæmia shows itself the drug should be discontinued.

Gray powder (hydrargyrum cum cretâ) is also used by many. It is sometimes quite efficient in its action, and commonly it is less liable to produce gastro-intestinal reaction than any other mercurial. Its use is indicated in very weak infants with a tendency to great disturbance of the stomach and bowels. It is, however, not uniformly efficacious. It may be given in doses of from $\frac{1}{8}$ to $\frac{1}{3}$ of a grain three times daily.

The protoiodide of mercury has been used in the treatment of hereditary syphilis with more or less benefit for many years.

In very young children it is well, if the protoiodide is used, to begin with $\frac{1}{20}$ grain, which may be increased according to indications. Though it is an efficient remedy in children, its use is commonly attended with colic and intestinal derangements, which necessitates the admixture of powdered opium or Dover's powder.

In administering these mercurial powders the physician should always be on the watch as to their action and as to the condition of the little patient. In general, interrupted courses of a month or six weeks' duration should be followed, during which the child should have plenty of fresh air and every conceivable hygienic benefit.

By many authors corrosive sublimate is held in high esteem in the treatment of hereditary syphilis. It is used chiefly in the very early weeks of life and throughout the first year. If used, it is best given in the form of Van Swieten's liquid in combination with a little milk. For very young children the dose of this liquid is 5 to 10 drops two or three times a day, which is to be increased considerably for older children.

Iodide of potassium has a rather limited sphere in the treatment of hereditary syphilis. It may be of benefit in bone, joint, and cerebral affections, and in lesions of the eye and ear. The dose of the iodide for very young infants is from $\frac{1}{2}$ to 1 grain, well diluted, three times a day. For children of a year or older, 5 grains or more may be given three times daily.

The mixed treatment is very efficient in many cases of hereditary syphilis, particularly of the bones and viscera, and in syphilitic subcutaneous tumors.

In addition to this treatment by the mouth, other methods of using mercury are employed in the treatment of hereditary syphilis. As a general rule, mercury by stomach ingestion is to be recommended for the first year of the child's life. As it grows older we can resort to mercurial inunctions. This method of treatment is as efficient for the infant and child as for the adult, and its administration to the former requires all the care and circumspection laid down as necessary for the latter. The inunctions should be given daily, using 15 or 20 grains of the strong mercurial ointment, going over the whole body after the plan already described. At the same time the child should receive an iron tonic, and perhaps cod-liver oil. Should evidences of debility, restlessness, and sleeplessness, of weakness or anæmia, show themselves, the inunctions should be stopped at once. In some cases, particularly in children a year or more old, the local use of mercurial ointment or of mercurial plasters is productive of much benefit. The ointment

may be spread upon canton-flannel or buckskin, bound around the child's body. By this means mercury is absorbed, and frequently benefit is noted, particularly in cases of enlarged liver or spleen. Mercurial inunctions and plasters are very effective in many cases of hereditary bone and joint disease. In intracranial syphilis, meningeal inflammation, gummy tumors, and hydrocephalus internus, this method, particularly when combined with iodide of potassium given internally, is often productive of surprising results. The quantity of mercurial ointment (50 per cent.) for each inunction is about 15 grains for a young child, and this quantity may be increased to 30 grains provided there are no contraindicating conditions, and that improvement is noted. Elsenberg advises full doses of the iodide internally, and the inunctions to be pushed until slight gingivitis or salivation is produced; then the dose should be diminished or the treatment temporarily stopped. It may be necessary and expedient thus to push this combination treatment, but it should only be done when the case is under the observation of the physician.

Hypodermic injections of solutions of bichloride of mercury have been used with benefit in cases of stomach intolerance and in those in which a prompt action was necessary. The dose varies according to the age of the child, the minimum dose being $\frac{1}{32}$ of a grain and the maximum $\frac{1}{8}$ of a grain.

Baths of corrosive sublimate are of great benefit in some cases of hereditary syphilis. They should never be relied upon as a methodical treatment. These baths are particularly indicated in cases of the bullous syphilide, of syphilitic roseola, of papular syphilides, condylomata about the genitals, and in cases in which there are complicating ulcerations. In children with a thin, atrophic skin, icterus, and enlarged spleen they may produce benefit. The quantity of the bichloride to be used varies in different cases. Thus $7\frac{1}{2}$ to 30 grains of sublimate, according to the age of the child, with an equal quantity of chloride of ammonium, dissolved in a glass of hot water, should be added to 7 or 8 gallons of warm water. The child should stay in this from five to ten minutes, and then should be wrapped up warmly and put to bed. If erythema follows this treatment, the surface should be dusted with infant powder; but if the reaction is severe and persistent, it may be necessary to discontinue the baths. The efficacy of the treatment may be ascertained after three or four baths. If the general condition of the child and its lesions are benefited, they may be continued. But signs of resulting depression, weakness, sleeplessness, and refusal of food should cause their discontinuance. The baths may be given every second day, or perhaps every third or fourth day.

Local applications to the lesions of hereditary syphilis should be

similar to those used in the acquired form of the disease. The ulcers and encrusted surfaces left by the bullous syphilide and other eruptions of an ulcerative character should first be washed with a 1 or 2 per cent. carbolic-acid solution, and then dressed with a zinc ointment to which 2 to 10 per cent. of calomel has been added. This ointment may be used for fissures about the mouth, nose, and anus. If a stimulant is admissible, 10 drops of carbolic acid may be added to each ounce of ointment.

White precipitate ointment and a combination of protoiodide of mercury and cold cream (10 to 20 grains to the ounce) may be useful in scaling papular eruptions, particularly of the palms and soles.

Rhinitis may be treated by the use of dilute Dobell's solution, injected slowly and carefully into the nostrils once or twice a day. This may be followed by the application of a solution of nitrate of silver ($\frac{1}{2}$ to 1 grain to the ounce of water). In some cases a mild solution of boric acid or of borax is beneficial in removing mucus and crusts. Mild solutions of nitrate of silver are necessary for mouth and lingual ulcerations. Condylomata lata of the genitals should be kept clean and dry, and should be dusted with a powder composed of calomel one drachm, and powdered starch one ounce. If the condylomata have become hypertrophic, they may be carefully touched with a solution of nitrate of silver (20 grains to the ounce), or with the ordinary acetic acid, or half-strength carbolic acid. When stimulating applications are made to these lesions great care should be taken to prevent inflammatory reaction.

Bone, joint, and fascial lesions should be treated with plasters formed of strong mercurial ointment and Lassar's paste, of each equal quantities. In the management of hereditary ocular and aural affections, besides an energetic internal treatment, such local measures are necessary as may be indicated by the condition present.

In general, the treatment of acquired syphilis in infants and young children is the same as that given for the hereditary form of the disease. In acquired syphilis of the young the physician has less trouble, for he usually is not confronted with the atrophic condition and the tendency to marasmus which are so common in the hereditary disease.

TREATMENT OF THE SYPHILITIC FATHER AND MOTHER.

It is now well known that men suffering from syphilis very frequently procreate infected children whose mothers, unless infected by some active lesion, may remain free from the disease. Therefore it is the duty of the physician to explain to a syphilitic father that his disease is liable to infect his offspring, and to urge him to avail himself of all possible measures to rid himself of it.

The management of syphilis in the pregnant woman requires of the physician skill, care, and watchfulness. As soon as the chancre is

diagnosticated it should be treated carefully and efficiently. Lesions of any kind on the genitals of the pregnant woman indicate the necessity for great cleanliness. This is especially necessary when chancre is present. Therefore frequent mild antiseptic injections and ablutions should be made to the parts, in order to avoid complicating inflammatory conditions. Then mercurial ointment on cotton or lint should be applied continually to the chancre. Throughout the course of gestation this antisepsis of the external genitals should be regularly followed.

It is well to institute a systematic inunction treatment, with all the precautions and safeguards spoken of in the section upon this branch of the subject. No pains should be spared in watching the woman to learn that all goes well and that the therapeutic effect is being obtained. In this way course after course of inunction should be given, with proper intervals of rest, during the whole period of pregnancy. If the treatment is carefully administered and the general condition and surroundings of the woman are favorable, there will be no trouble in keeping on to the end.

In like manner, if admissible, hypodermic injections of sublimate will be found of especial benefit. They should be given for a week or two at a time, in the retrotrochanteric regions principally. One very great advantage of the inunction and of the injection methods is that the stomach—so prone to rebel—and the intestines are spared.

But it often happens that objections to these methods are offered, and that the condition of the patient will not permit of their employment. In this event it will be necessary to resort to the solution of mercury and potassium iodide spoken of on page 680.

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